USE OF BAYESIAN INFERENCE TO ESTIMATE DIVERSION LIKELIHOOD IN A PUREX FACILITY

By

Oliver Russell Rodewald

SUBMITTED TO THE DEPARTMENT OF NUCLEAR SCIENCE AND ENGINEERING

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREES OF

BACHELOR OF SCIENCE IN NUCLEAR SCIENCE AND ENGINEERING
AND
MASTER OF SCIENCE IN NUCLEAR SCIENCE AND ENGINEERING
AT THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

JUNE 2011

Signature of Author: _____
Oliver Russell Rodewald
Department of Nuclear Science and Engineering
May 24, 2011

Certified By: _____
Michael W. Golay
Professor of Nuclear Science and Engineering
Thesis Supervisor

Certified By: _____
Charles W. Forsberg
Research Scientist
Thesis Reader

Accepted By: _____
Mujid Kazimi
KEPCO Professor of Nuclear Engineering
Chair, Department Committee on Graduate Students

Use of Bayesian Inference to Estimate Diversion Likelihood in a PUREX Facility

By

Oliver Russell Rodewald

Submitted to the Department of Nuclear Science and Engineering on May 24, 2011 in Partial Fulfillment of the Requirements for the degrees of Bachelor of Science in Nuclear Science and Engineering and Master of Science in Nuclear Science and Engineering

Abstract

Nuclear Fuel reprocessing is done today with the PUREX process, which has been demonstrated to work at industrial scales at several facilities around the world. Use of the PUREX process results in the creation of a stream of pure plutonium, which allows the process to be potentially used by a proliferator. Safeguards have been put in place by the IAEA and other agencies to guard against the possibility of diversion and misuse, but the cost of these safeguards and the intrusion into a facility they represent could cause a fuel reprocessing facility operator to consider foregoing standard safeguards in favor of diversion detection that is less intrusive. Use of subjective expertise in a Bayesian network offers a unique opportunity to monitor a fuel reprocessing facility while collecting limited information compared to traditional safeguards. This work focuses on the preliminary creation of a proof of concept Bayesian network and its application to a model nuclear fuel reprocessing facility.

Thesis Supervisor: Michael W. Golay
Title: Professor of Nuclear Science and Engineering

Thesis Reader: Charles W. Forsberg
Title: Research Scientist

Acknowledgements

I am heartily thankful to the many wonderful people who have helped me in the process of completing my thesis. With their guidance and understanding, I hope that I have been able to complete work that is of value to all people of goodwill.

First and foremost I would like to thank the numerous professionals with whom I had the opportunity to interact. Drs. Bathke, Collins, Ehinger, Howell, Krebs, and Regalbuto generously made themselves available to me, affording me the opportunity to understand many elements of the reality of how spent nuclear fuel reprocessing works in the real world. These informative discussions allowed me a chance to understand the sheer scale and complexity of the challenges in this area of nonproliferation at a depth to which no textbook can go.

Beyond the understanding of how real-world fuel reprocessing works, I would like to thank Dr. Tompkins for helping me translate this understanding into a way of creating a tool that can be used to detect diversion. His extensive knowledge in seemingly anything vaguely related to any kind of statistics—Bayesian or otherwise—coupled with his willingness to answer even the most simple of my questions guided me to success in creating simple models to detect diversion.

I would not have been able to produce coherent work without the guidance of Dr. Leishman and Professor Golay. Dr. Leishman provided me with high-level guidance and inspiration crucial to completing this work. Professor Golay's insistence on an appropriate scope, focus, and consideration of numerous options in the conduct of this work was key to ensuring that I was able to complete something coherent. I would also like to thank Professor Golay for his patience, guidance, and understanding throughout this process.

Last, but most certainly not least, I would like to thank Heather Barry and Clare Egan in the Department's office for being a valuable resource in navigating the administrative aspects of the thesis submission and degree completion process. Their kindness and the clarity with which they provided me information on this process most definitely mitigated my fears of the unknown and allowed me to sleep easier at night.

Table Of Contents

Abstract 2

Acknowledgements 4

Table Of Contents 5

List of Figures 7

List of Tables 7

1 Introduction 8

1.1 Overview of Spent Fuel Reprocessing Techniques 9

1.1.1 Basics of Solvent Extraction 10

1.1.1.1 Use of Two Immiscible Phases 11

1.1.1.2 Role of Distribution Coefficients 12

1.1.1.3 Role of Flowrates 13

1.1.2 Simulation of Solvent Extraction Processes 14

1.2 Process Manipulations Causing Diversion 14

1.3 Background on the Detection of Diversion 15

1.3.1 Deterministic Nuclear Chemical Models 16

1.3.2 Other Approaches 17

1.4 Use of Bayesian Networks to detect Diversion 18

1.5 Approach used in this Work 19

2 The Model Fuel Recycling Facility 20

2.1 Basic Design 20

2.1.1 Sizing the facility 21

2.1.2 Flowsheet Design 21

2.1.3 Equipment and reductants in the MFRF 23

2.1.4 Diversion Scenarios 25

2.1.5 Limitations of the MFRF Design 25

2.2 Operating Limits 26

2.2.1 Flow Rates 27

2.2.2 Hydroxylamine Concentration 29

2.2.3 Nitric Acid Concentration 30

2.2.4 Inextractable Nitrate Concentration 30

2.2.5 Temperature 31

3 Diversion Characterization 31

3.1 Diversion Defined 32
3.2 Fissile Material of Interest 32
3.3 Diversion Timeframe 32
3.4 Adversary Characterization 34
3.5 Facility Type and Bounds 35
3.6 Summary 37
4 Diversion Detection 37
4.1 Regression Analysis 37
4.2 Creation of a Bayesian Network 39
4.2.1 Plausible Process Manipulations 40
4.2.2 States of full knowledge 42
4.2.3 State of No Knowledge 43
4.2.4 States of Partial Knowledge 43
4.2.5 Increasing information and Inference on Facility State 45
4.2.6 Structure of Bayesian Network 46
4.2.7 Generation of Conditional Probability Tables 47
4.2.7.1 Manipulable Process Parameter Nodes 47
4.2.7.2 Hypothesis Node 49
5 Use of Bayesian Network to Detect Diversion 50
5.1 Normal Operating Conditions 51
5.2 Malfunction Case 52
5.3 Diversion Through Raffinate 54
5.2 Second Case: Diversion through Solvent Recycle Stream 57
5.5 Analysis of Bayesian Network Performance in Diversion Detection. 61
6 Conclusions 62
6.1 Future Work 63
6.1.1 Sampling of Variables and Adversary Preference 63
6.1.2 Open-source Solvent Extraction of Fuel Reprocessing Facility Software ... 64
6.1.3 Interpretation of results of Updated Hypotheses 64
6.3 Possible Applications 65
Bibliography 66
Appendix A: SEPHIS Calculations Pertaining to the MFRF 68
A.1 MFRF in steady-state, normal configuration 68

A.2 MFRF in Malfunction Configuration 72
A.3 MFRF in Raffinate Diversion Scenario 83
A.4 MFRF in Solvent Recycle Diversion Scenario 94
Appendix B: Conditional Probability Tables 105
B.1 8-hour Conditional Probability Tables 106
B.2 12-hour Conditional Probability Tables 108
B.3 16-hour Conditional Probability Tables 110
B.4 24-hour Conditional Probability Tables 112
B.5 48-hour Conditional Probability Tables 114
B.6 72-hour Conditional Probability Tables 116

List of Figures

Figure 1: Overview of Work 20
Figure 2: MFRF First Cycle Flowsheet 22
Figure 3: Flowrate Data from Barnwell Test Run 28
Figure 4: Schematic Flowsheet with Diversion Streams Indicated 35
Figure 5: Diversion Process 36
Figure 6: Distributions associated With States of Knowledge 44
Figure 7: Effect of Increasing Information on Facility State 46
Figure 8: Structure of Bayesian Network 47
Figure 9: MFRF Malfunction Case 53
Figure 10: Raffinate Diversion Scenario 55
Figure 11: Bayesian Updating of Eight Hour Network 56
Figure 12: Solvent Recycle Diversion Scenario 59
Figure 13: Solvent Recycle Diversion in Bayesian Network 60

List of Tables

Table 1: Qualitative Actions Enabling Diversion 15
Table 2: MFRF First Cycle Input and Output Flows 23
Table 3: Potentially Manipulable Parameters 38
Table 4: Example Conditional Probability Tables 48
Table 5: Prior Probability of Diversion 50
Table 6: Probability of Diversion in Normal Conditions 51
Table 7: Probability of Diversion in Malfunction Case 53
Table 8: Probability of Diversion in Raffinate Scenario 57
Table 9: MFRF Configuration in Solvent Recycle Diversion 58
Table 10: Probability of Diversion in Solvent Recycle Scenario 60

1 Introduction

Spent nuclear fuel reprocessing was originally developed using the PUREX method, which separates plutonium and uranium from irradiated targets, producing uranium and plutonium each in a separate product stream. Much of the work on reprocessing was undertaken in the early days of nuclear energy and done for defense rather than civilian purposes. As the civilian nuclear industry started to grow, fear about shortages in the world's supply of uranium provided motivation for reprocessing spent nuclear fuel to offset the perceived shortage of natural uranium. With time, however, nuclear fuel reprocessing became politically unfavorable as well as expensive. As a result, by the 1980s there was very little reprocessing in the United States. It is also important to note that reprocessing had not become a very large and well established business by this time either, and that much of the information regarding operating reprocessing facilities is tightly controlled either by industry or the government[1].

Nuclear fuel reprocessing is largely absent from the civilian nuclear power establishment in the United States, and there are few countries that are actively involved in reprocessing. The leading countries that reprocess spent nuclear fuel are generally either already weapons states under the Nonproliferation Treaty (NPT) or have no desire to create a weapons program. That said, rogue states have claimed civilian use in order to gain access to nuclear technology while actually pursuing the development of nuclear weapons. A rogue state might accept the terms of the NPT to gain access to technologies and build reprocessing facilities without eliminating the desire to produce nuclear weapons. Furthermore, the current system of safeguards at

fuel cycle facilities is imperfect, as the system of safeguards is often thought of as needlessly inexpensive or ineffective, depending on how safeguards are implemented.

To ensure that diversion of fissile material is not occurring, that is, to ensure that all fissile material is being re-purposed as fuel, the IAEA monitors the inventory of fissile material flowing through a reprocessing facility. The IAEA has set forth goals of detecting *significant quantities* of fissile material, which amount to the minimum amount of material one could use to make a nuclear device. The amount of material contained within a significant quantity of material is in the matter of a few kilograms, whereas the annual facility throughput for a real industrial reprocessing facility is in the hundreds or thousands of metric tons.

As a result of the amount of material needed for a nuclear device being very much less than the annual throughput of an industrial reprocessing facility, there is concern that the process of measuring the fissile material inventory at a reprocessing facility could take a sufficiently long time that a measure of sufficient accuracy to detect the disappearance of a significant quantity is next to impossible. Additionally, such a measurement—if it occurs—is bound to be expensive.

1.1 Overview of Spent Fuel Reprocessing Techniques

Spent nuclear fuel is generally accepted to contain more than a preponderance of reusable material. Separating this reusable, fissile and/or fertile material from the waste can be done in a number of different ways. Each method of reprocessing has distinct advantages and disadvantages that allow this process to be uniquely tailored for what is desired in a specific context.

In the future, a robust separations process that is resistant to diversion is highly desired. Several candidate processes have emerged to include variations on the UREX processes as well as a number of pyrophysical and pyrochemical processes. While these processes certainly offer promise to future generations, they have not yet been demonstrated as feasible at the industrial level.

Indeed, the chemical processes demonstrated at industrial scales are primarily aqueous processes. Of the aqueous processes, the PUREX process emerged as the favored process because it achieved high levels of product decontamination while minimizing the volume of solid waste characteristic of other processes. PUREX also avoids the use of extremely volatile chemicals characteristic of other processes[2]. The PUREX process, being the most widely used process in the world today, then, is the subject of the work reported here.

1.1.1 Basics of Solvent Extraction

PUREX is an abbreviation for *Plutonium and Uranium Extraction*, and, as the name suggests, the process is a liquid-liquid solvent extraction process. Solvent extraction processes, in general, are quite versatile and can be tailored to separate out certain elements from others. In addition to being used to separate uranium and plutonium from spent nuclear fuel, solvent extraction processes have been applied in a number of other areas in which the separation and purification of a single element is desirable; copper, nickel, and precious metals are just a few of the metals that can be separated and purified using a solvent extraction process [3].

There is a great deal of literature detailing the specific aspects of the chemistry of solvent extraction as applied in a number of different settings; for the separation of uranium and plutonium from spent nuclear fuel, it is unlikely that better resources than Long's *Engineering for Nuclear Fuel Reprocessing* and Benedict's *Nuclear Chemical Engineering* can be found[4][5]. The purpose of this section is to provide a very high level overview of how uranium and plutonium are separated from fission products and actinides in spent nuclear fuel.

1.1.1.1 Use of Two Immiscible Phases

In a PUREX plant, the spent nuclear fuel is sheared or chopped, and placed into a hot nitric acid solution. The hot nitric acid solution dissolves the spent nuclear fuel. At this point, fission gases are captured and treated appropriately. Before the nitric acid solution containing the uranium, plutonium, and various wastes is allowed to enter the solvent extraction process, the acidity is adjusted to the appropriate levels to ensure the process is run effectively.

Once the acidity of the nitric acid solution containing the uranium, plutonium, and various wastes is adjusted to an appropriate level, this feed solution is allowed to enter the solvent extraction portion of the process. The feed solution is initially an aqueous solution, and it is brought into contact with an organic solvent. The organic solvent used in the PUREX process is typically n-dodecane, which can be thought of as highly purified kerosene. Added to this solvent is some amount of tributyl phosphate. Aqueous and organic streams separate themselves based on density, and the two are generally immiscible.

That the two streams are immiscible and have different densities ultimately allows separation to occur. The separation of desired elements from the undesired elements cannot occur unless the two streams are brought into physical contact with each other in such a way that allows the desired elements to transfer phase—basically allowing them to jump from the aqueous phase to the organic phase or vice versa. The ability for the dissolved substances to transfer from one phase to the other is dependent upon the area of contact between the two phases. Several types of equipment may be used to cause this contact, but there have been three types of equipment that have been historically used in reprocessing facilities: mixer-settlers, pulsed columns, and centrifugal contactors [6]. Each type of equipment maximizes the area of contact between the two phases through thorough mixing. It is beyond the scope of the work reported here to delve into the pros and cons of each type of equipment.

In the most general sense, these three types of contacting equipment allow three ways do what one may do in the kitchen mixing oil and water with a whisk: mixing the oil into water in small droplets then letting the water and oil separate back out, except instead of occurring in a kitchen with innocuous ingredients, this contact occurs in a hot cell with highly radioactive and generally dangerous solutions.

1.1.1.2 Role of Distribution Coefficients

At any given point in the solvent extraction process, each element will exhibit a certain preference for one phase—either aqueous or organic—over the other. This preference can be expressed in terms of a distribution coefficient, which gives the ratio of the concentration of the element in the organic phase to the concentration of the

element in the aqueous phase. The ability to manipulate the distribution coefficient is key to extracting the uranium and plutonium from spent nuclear fuel with very high levels of purity.

In a standard reprocessing facility, the distribution coefficient is affected by a number of factors, most markedly the nitric acid concentration of the aqueous phase and the valence state of the element. The valence state of the element can be changed by the presence of other chemicals that essentially reduce the valence state of a given element; the model facility developed for the work reported here uses hydroxylamine nitrate, but this is by no means the only reducing agent available to a facility operator.

1.1.1.3 Role of Flowrates

The last piece of solvent extraction comes to the use of flowrates to regulate how the mass of materials moves through the process. Uranium and plutonium form chemical complexes with tributyl phosphate. It is important to note that most of the other elements in spent nuclear fuel cannot form these chemical complexes with tributyl phosphate. Without the ability to form these complexes, uranium and plutonium would not move from the aqueous phase into the organic phase. When all of the tributyl phosphate is utilized and there is no empty or available tributyl phosphate to form complexes with uranium or plutonium, that extra uranium or plutonium is left in the aqueous phase. The ratio of the flowrates, aqueous to organic, essentially allows the appropriate amount of tributyl phosphate to be used in the process at any given time.

Because altering flowrates adjusts the abundance of available tributyl phosphate complexing sites relative to the amount of uranium and plutonium in solution, the

flowrate ratio also determines the number of times an aqueous phase and organic phase must be brought into contact with each other. This effect is very important to the design of a facility's flowsheet as well as ensuring that a facility given a particular flowrate will function as desired.

1.1.2 Simulation of Solvent Extraction Processes

A number of different simulations exist to predict the behavior of the solvent extraction portion of a spent nuclear fuel reprocessing facility as well as other portions of a given facility. By and large, however, these codes are not generally available to the public. [7]

For a very basic level of simulation SEPHIS-MOD4 may be used. SEPHIS, written in FORTRAN 77 was modified to enable modeling of the PUREX process and released as SEPHIS-MOD4 in 1979 [8]. While certainly an old code, SEPHIS has been validated in its ability to model the flow of uranium and plutonium through the solvent extraction process [9], and it has been used in the simulated detection of diversion [10]. Because SEPHIS has been validated to accurately model the flow of uranium and plutonium in the solvent extraction process and because the SEPHIS-MOD4 source code is available to the general public, it is the tool that is used to simulate the model fuel recycling facility used for the work reported here.

1.2 Process Manipulations Causing Diversion

With the ability to simulate the solvent extraction process well in hand, there are a number of process manipulations of interest. Some of these process manipulations will result in an off-spec product, while others will result in diversion as defined in

subsequent sections. At a very basic level, diversion through process manipulation places fissile material in an aqueous stream or an organic stream where fissile material is not normally seen. Taken as a departure from normal conditions, Table 1: Qualitative Actions Enabling Diversion lists a few changes that can be made. These actions in the table may be taken individually or in combination with other actions to cause diversion; the extent to which these actions are undertaken is dependent upon a large number of factors, most of which go beyond the scope of the work reported on here.

Diversion into Aqueous Stream	Diversion into Organic Stream
Reduce aqueous nitric acid concentration	Increase aqueous nitric acid concentration
Increase aqueous stream flowrate	Decrease aqueous stream flowrate
Decrease organic stream flowrate	Increase organic stream flowrate
Increase reductant concentration	Decrease reductant concentration

Table 1: Qualitative Actions Enabling Diversion

In the work reported here, the qualitative actions enabling diversion are evaluated on their credibility as pathways to diversion. Further, diversion scenarios in both the aqueous and organic stream are simulated to test the Bayesian networks used to detect diversion.

1.3 Background on the Detection of Diversion

Several approaches have been used to detect the diversion of uranium and plutonium from a nuclear fuel reprocessing facility. Many of these approaches are best qualified as deterministic approaches involving direct knowledge of a model facility. Models not involving purely deterministic approaches and approaches from areas outside the nuclear sector can also potentially be modified and applied to the problem of diversion detection.

As is practiced by the IAEA, safeguards and diversion detection relies upon strict material accountancy. This is to say that prevention of diversion means that the amount of material flowing into a facility must be equal to the amount of material flowing out of a facility. This material balance is obtained through the use of various sensors of concentrations, flowrates, gamma and neutron counts, and myriad other types of measurements all taken at key measurement points in the process. The data is logged, verified, and from time to time, audits are done to ensure that no material is missing. This accountancy forms the backbone for the deterministic nuclear chemical models that seek to improve the performance of such a system.

1.3.1 Deterministic Nuclear Chemical Models

Many of the deterministic models simply track material over time to enable accounting. One of the earliest of these models is the Schneider model of 1980 [11], which used SEPIHS to account for inventories and time history of these inventories by assuming direct knowledge of key variables such as flow rates and concentrations. The work of Burr and Wangen over a decade later uses cumulative sum and Mahalanobis distances to detect departures from normal conditions and the accumulation of diverted material unaccounted for [12][13]. Both of these models look at material flowing from tanks in one part of the process to another.

Zeng has completed research that provides a probability that material diversion is occurring by introducing randomness into the solvent extraction process dynamics[14]. By accounting for the random variation seen over the course of normal plant operation, the material unaccounted for at a facility can be compared the amount of material one

would expect to be unaccounted for. Significant differences are then indicative of diversion.

Cipiti and Rickers' work has coupled SEPHIS to MATLAB to enable simulation of an entire facility from head to tail. This model takes into account what one would expect to see from the equipment used to make safeguards measurements, and the model is used to propose additional measurement points to increase the ability to detect diversion[15][16].

1.3.2 Other Approaches

Work in chemical process control outside the nuclear sector has resulted in the examination of additional methods of fault detection. In a sense, if diversion can be modeled as a type of fault, these methods could be equally applicable to a nuclear fuel reprocessing facility. Caccavale's work deals with detecting faults with sensors to determine whether or not a fault reported is a fault within the plant and its process or simply a fault within the sensor[17]. Huang's work deals with Bayesian methods in plant control, focusing on sensor data in incorporating this data into the control of a given plant. Of particular interest is the Huang's approach to aggregate data from multiple sources to detect a potential fault and then raise or squelch an alarm[18].

Perhaps most applicable is the work of Nielsen and Jensen who inferred a Bayesian network from the operating data from an industrial production facility. While this industrial production facility is a power plant rather than a fuel reprocessing facility, should data from a fuel reprocessing facility be available for researchers to use, it is likely that a similar approach could be used to detect diversion with good fidelity [19].

1.4 Use of Bayesian Networks to detect Diversion

In the absence of hard data to detect diversion from a spent fuel reprocessing facility, expert-created Bayesian networks can be used as a means of systematically gathering and collecting information that either affirms or denies a hypothesis. Bayesian networks are directed acyclic graphs that allow the user of the network the ability to make inferences with whatever data is at hand. These inferences are made by Bayesian updating wherein evidence gathered is used to update a prior distribution to a posterior distribution. In general terms, the prior distribution is what one would expect with no data at hand, and the posterior distribution is what one would expect as additional data are gathered.

It is important to note that Bayesian networks are driven heavily by the use of expert opinion and subjective probability, but this will always be the case when dealing with nuclear proliferation. Proliferation has occurred only a small number of times and is reliant upon an actor deciding to proliferate. As such, it is very difficult—if not impossible—to objectively quantify the likelihood that an actor will proliferate; this means that subjective expertise will be used in some form or another. Use of subjective expertise in a Bayesian network is preferred over use of such expertise in qualitative assessments because in a Bayesian network this expertise is incorporated in an explicit way that allows one to make judgments both about the process used in the assessment as well as the system itself in ways that a simple qualitative assessment would not allow.

In this way, the Bayesian network can function as a diagnostic tool, diagnosing the facility state as either normal or diversion. While perhaps imperfect, a number of tools

and approaches do exist to enable information to be effectively gathered from experts [20]. As information is gathered and placed into the network, numerous software packages to create Bayesian networks are readily available [21].

1.5 Approach used in this Work

The work reported here explores the likelihood of diversion to occur in a Model Fuel Reprocessing Facility and examines the feasibility of detecting diversion through the use of a Bayesian network that relies on subjective expertise. In order to create a Bayesian network that detects diversion with some level of effectiveness, a number of steps needs to be taken. Each of these steps enhances and utilizes the subjective information that is ultimately systematically compiled into a usable form—that of the Bayesian network.

This section covers the creation of the Model Fuel Recycling Facility, characterizes what diversion is, and outlines how to detect diversion using this information and the accumulation of subjective expertise. The contribution of the work reported here is to compile information from a number of different sources and utilize this information to create a proof-of-concept Bayesian network that can be used to distinguish between facility states, ultimately detecting diversion. Throughout this process, subjective expertise is used extensively; this is illustrated in Figure 1: Overview of Work in which the generalized tasks are presented in rectangular boxes and the types of subjective expertise used is presented as text in ovular shapes.

The general idea of the work presented here is to use this subjective expertise with a reduced data set—only flowrates are measured in the cases presented in the later

section 5 Use of Bayesian Network to Detect Diversion; this limited set of data collected stands in contrast to the much larger set generally collected by traditional safeguards relying on strict material accountancy.

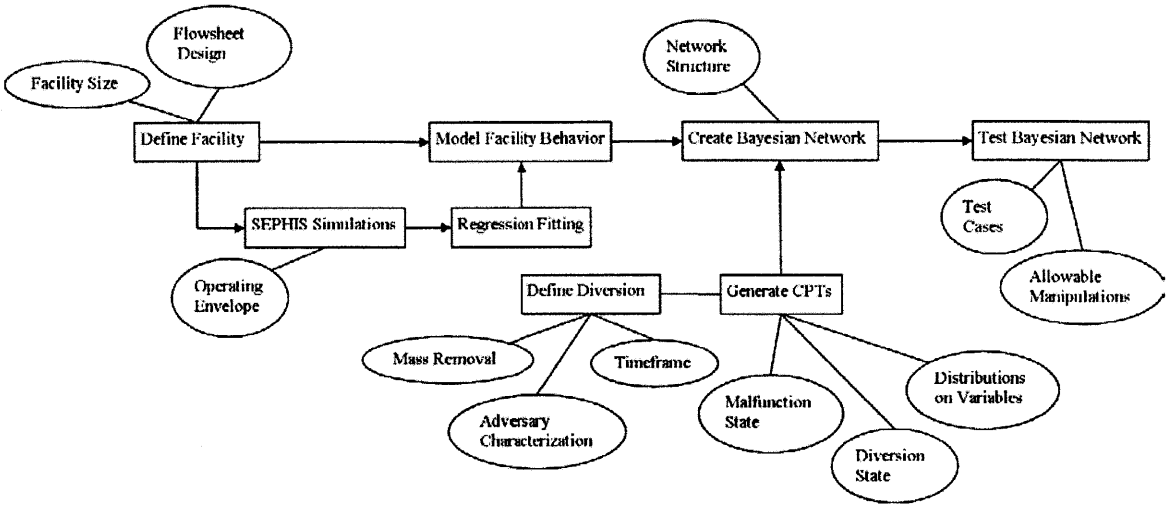

Figure 1: Overview of Work

2 The Model Fuel Recycling Facility

2.1 Basic Design

The purpose of the Model Fuel Recycling Facility is to provide a simple, realistic model of a PUREX facility. In providing a realistic environment, the MFRF provides a set of data that allows the Facility State Diversion Detection Model to be evaluated. In order to do this, it is paramount that the MFRF be a simple and accessible model; for this reason it is based on publicly available flowsheets and run in open-source code. Additionally, the MFRF is sized in such a way as to make detection of diversion by traditional methods difficult. For example, measures such as material unaccounted for (MUF) of a very large facility are also expected to be very large.

2.1.1 Sizing the facility

The MFRF is sized to accommodate roughly half of the spent nuclear fuel produced in the United States in a given year. This is a rough estimate calculated as follows: it is assumed that there are 100 operating reactors in the United States, and the MFRF will take the spent fuel from half of these reactors. At 250kg of heavy metal per fuel assembly, 500 fuel assemblies per reactor, one third of all fuel assemblies replaced during and outage, and an outage every eighteen months, the MFRF will process approximately 1390 MTHM/yr.

Detecting diversion at such a large facility is likely to be more difficult than at a smaller facility because the mass flow rates are sufficiently high that small manipulations to the process can result in more material unaccounted for such a change would produce in a smaller facility.

Nevertheless, the approach used to detect likely diversion at the MFRF is also be applicable to smaller facilities because this approach is somewhat independent of being able to determine the inventory of a facility; rather, the approach focuses on the state of the facility.

2.1.2 Flowsheet Design

The MFRF is designed to use a multiple cycle low-acid PUREX flowsheet. The MFRF flowsheet is conceptually based on the low-acid flowsheets provided in *Nuclear Chemical Engineering* and *Engineering for Nuclear Fuel Reprocessing,* though the MFRF flowsheet reproduced provides a greater level of detail than is provided by either Long

or Benedict [4][5]. Even though the use of the Model Fuel Recycling Facility assumes that multiple cycles are used, waste backcycling is not explicitly accounted for in this work. The focus of this work is on the most basic aspect of the plant—the first cycle. Diversion in the second and third plutonium cycles would likely propagate changes back to the first cycle, the effects of which are beyond the scope of this work.

The MFRF uses the first-cycle flowsheet as illustrated in Figure 2: MFRF First Cycle Flowsheet. Also included are characterizations of the input and output flows under normal steady-state operating conditions. Normal operating conditions are chosen for relative stability and adjusted using a one-at-a time method.

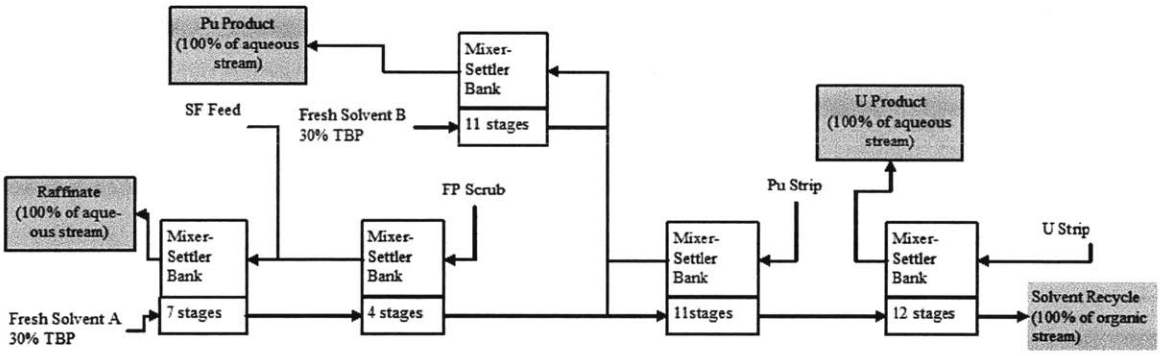

Figure 2: MFRF First Cycle Flowsheet

Input Stream	Flow Rate (L/min)	[HNO3] (mol/L)	[U] (g/L)	[Pu(IV)] (g/L)	[Hydroxylamine] (mol/L)	[Inextractable NO3] (mol/L)
Fresh Solvent A	65.0	0.0	0.0	0.0	0.0	0.0
SF Feed	14.1	1.25	285.0	3.0	0.0	0.03
FP Scrub	10.0	2.0	0.0	0.0	0.0	0.0
Fresh Solvent B	15.0	0.0	0.0	0.0	0.0	0.0
Pu Strip	14.0	0.30	0.0	.0.0	0.07	0.07
U Strip	100.0	0.03	0.0	0.0	0.0	0.0

Output Stream	[HNO3] (mol/L)	[U] (g/L)	[Pu(IV)] (g/L)	[Pu(III)] (g/L)	[Hydroxylamine] (mol/L)	[Inextractable NO3] (mol/L)
Raffinate	9.612×10^{-01}	7.254×10^{-10}	9.320×10^{-09}	0.00×10^{0}	0.00×10^{0}	1.892×10^{-02}
Pu Product	1.253×10^{00}	4.194×10^{-13}	0.00×10^{0}	2.880×10^{0}	5.587×10^{-02}	6.792×10^{-02}
U Product	5.420×10^{-02}	3.818×10^{01}	5.425×10^{-11}	0.00×10^{0}	0.00×10^{0}	0.00×10^{0}
Solvent Recycle	5.169×10^{-04}	8.638×10^{-13}	0.00×10^{0}	—	—	—

Table 2: MFRF First Cycle Input and Output Flows

2.1.3 Equipment and reductants in the MFRF

Above all, the MFRF is designed to be a simple test-bed for the Bayesian method of detecting diversion. As such, it is designed to be readily compatible with SEPHIS-MOD4, an open-source code written in 1979 for solvent extraction processes. SEPHIS-MOD4 simulates mixer settler banks that thoroughly mix the aqueous and organic liquids and allows chemical equilibrium to be reached. In modeling equilibrium reached through such contacts in mixer settler banks, SEPHIS is recognized as capable both in the code manual by its author and subsequent papers [8][9].

Though SEPHIS-MOD4 can be manipulated to model pulse columns, such modeling departs from the design of the code and is not expected to remain the same level of fidelity to reality [8]. In the interest of fidelity to chemical reality, the MFRF is designed to use mixer settlers. Furthermore, for similar reasons, as SEPHIS-MOD4 models

hydroxylamine as a reductant, hydroxylamine is used in the MFRF to reduce Pu(IV) to Pu(III).

The use of mixer settlers and hydroxylamine as a reductant in the MFRF provides a baseline for facility behavior and an initial example for the Bayesian approach to be evaluated for a PUREX facility. Reflecting the reality than many PUREX facilities use pulsed columns, centrifugal contactors, and other reductants, open-source tools to model facilities would certainly be useful, but it is not the purpose of the work covered herein to develop such tools.

Were the findings of the MFRF to be extrapolated to other facilities using equipment other than mixer settlers, there would be a few differences in the transient responses to a change of operating conditions as follows:

- Use of centrifugal contactors instead of mixer settlers would result in changes being propagated very quickly, as the residence time in centrifugal contactors is nearly negligible. The amount of material "in process" at any given point in time would also be smaller.
- Use of pulsed columns instead of mixer settlers would result in changes being propagated more quickly, but changes would not be propagated as quickly as if centrifugal contactors were used. The amount of material "in process" at any given point in time would also be smaller than that of a mixer settler facility, but much larger than that of a centrifugal contactor facility.

2.1.4 Diversion Scenarios

The Raffinate and Solvent Recycle streams for the first cycle are considered the potential pathways for diversion. Diversion, taken as the removal of fissile material from the process, is driven largely by the product of the concentration of uranium and plutonium in the output streams and the volumetric flow rates of these streams. Further assessment of the viability of these output streams as possibilities for a diverter is included in subsequent sections.

2.1.5 Limitations of the MFRF Design

Above all the MFRF is a simple facility run in an open-source tool, SEPHIS, designed to showcase diversion detection through determining facility state. In the interest of having a model faithful to the chemistry of PUREX reprocessing, there are some inherent limitations.

The most modern equipment, such as centrifugal contactors and pulsed columns are not included. Inclusion of modern equipment, however, would not change the chemical aspects of the model situation, though the use of modern equipment would change the response of the MFRF over time.

SEPHIS assumes that the facility will always be in some kind of an equilibrium condition and does not accurately predict non-equilibrium conditions [22]. The unavailability of non-equilibrium conditions is a serious limitation for SEPHIS, especially when examining diversion by chemical manipulation; however, the unavailability of open-source solvent extraction programs precludes the inclusion of non-equilibrium conditions for the initial examinations of the facility state diversion detection model.

The MFRF in SEPHIS also does not model hold-up, nor does it model the formation of plutonium polymers. Both of these situations can result in fissile material being unaccounted for, but neither should drastically affect the performance of the facility Bayesian diversion detection model, which attempts to determine facility operator intent via the operator's manipulation of process conditions. A certain degree of holdup is recognized as a naturally occurring phenomenon in the solvent extraction process and is a burden to traditional accounting methods [23]. Plutonium polymer formation is regarded as a potential safety hazard and is not regarded as a viable diversion in the context of this work[24].

Lastly, the Model Fuel Recycling Facility only includes models of the solvent extraction portion of a spent fuel reprocessing plant. Additional diversions are possible in other areas of the plant, but they are not modeled in the MFRF. The focus of diversion detection in the context of this work is on the solvent extraction portion of the facility. Expanding this model to other portions of the facility is an opportunity for further work.

2.2 Operating Limits

With the flowsheet of the model fuel recycling facility defined, an envelope of plausible operating parameters is created in order to place bounds what a facility operator could do. It is assumed that a facility operator would respect safety concerns because even an operator intent on proliferating would not want to risk losing the plant due to a serious safety accident.

2.2.1 Flow Rates

In theory, flowrates can be varied to any rate from zero to infinity, but this is not reflective of the reality of reprocessing plants as they are constructed. The limiting factors of the flowrates in plants are the number, size, and configuration of tanks throughout the different process areas, the maximum allowable pressure at any point in the piping in the facility, and the capability for air lift systems or pumps to increase or decrease flowrates from the nominal values.

All of these factors that control the range of flowrates are generally not readily available in the open literature, but based on conversations with experts in the field, it is expected that the tank configuration would most likely be the most limiting factor. If tank size is the most limiting factor, and if a rapid rise in flowrates would lead to the overfilling of tanks and other problems, and if tanks could not be both simultaneously filled and emptied, then the maximum flowrate would be limited to a small margin over nominal.

Data from a test run at the Barnwell facility was obtained and is represented in Figure 3: Flowrate Data from Barnwell Test Run [25]. The test run at Barnwell is a simulation of diversion while the Barnwell facility was undergoing uranium testing. The data is taken from 50 hours into the run to 150 hours into the run, a time during which the aqueous scrub flowrate is maintained roughly constant and the feed rate widely varied.

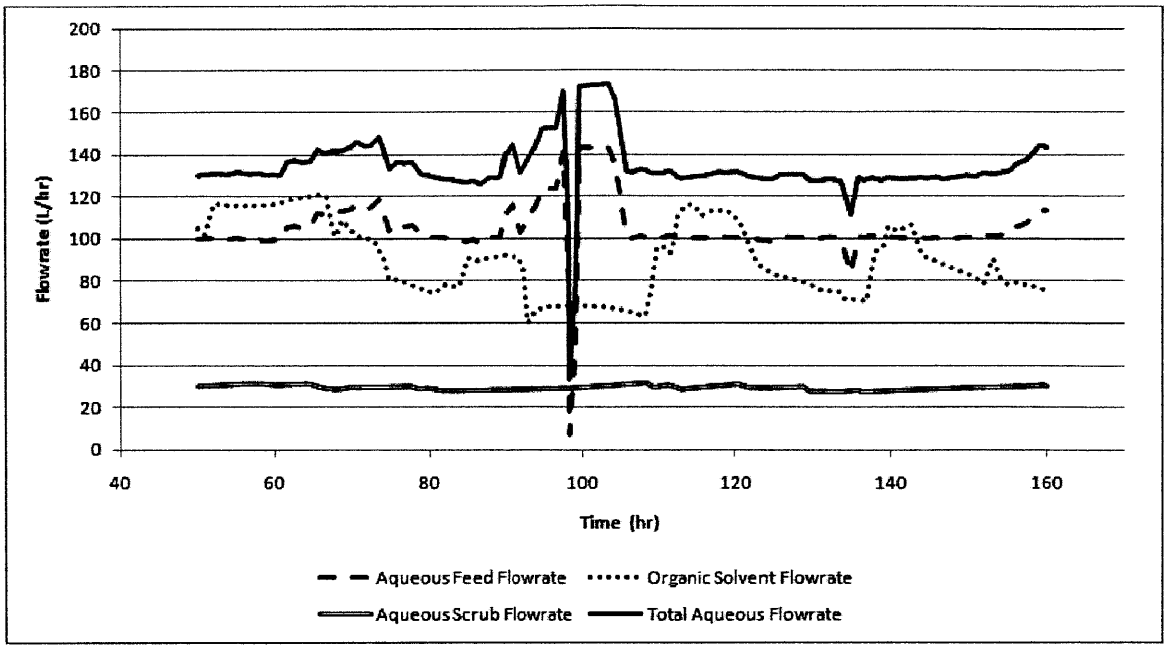

Figure 3: Flowrate Data from Barnwell Test Run

From the Barnwell test data, one can make several observations that allow for appropriate setting of parameters for a model simulated facility such as the MFRF. The peak flowrate to average flowrate from this test data is used to set the maximum possible flowrate for any of the input streams into the first cycle of the model fuel reprocessing facility. The maximum flowrate factor used in the MFRF is 1.3, representing a maximum possible flowrate 30% above the nominal flowrate; this is supported by the Barnwell data above, which provides a physical example of abnormal and divertive behavior.

Further, since the aqueous scrub flowrate is assumed to be held constant, the standard deviation associated with the oscillation about the mean is assumed to be the variation one would expect in a facility due to controller oscillations as well as

measurement errors of flowrates. For this data, the standard deviation is 9% of the mean flowrate.

2.2.2 Hydroxylamine Concentration

Hydroxylamine can be manufactured and shipped to facility operators at a wide range of concentrations, and it seems as if the ability to keep hydroxylamine at a given concentration is not at issue. THORP is reported to receive hydroxylamine nitrate at a concentration of 4.3M, and La Hague is reported to receive it at 1.9M. The DOE has conducted studies examining the autocatalytic reduction of hydroxylamine nitrate using concentrations as high as 16.7M. Most operating PUREX plants, however, do not even approach such high concentrations in process, as concentrations as low as 0.03M can be effective in reducing Pu(IV) to Pu(III) with appropriate flowsheet configuration.

The driver for the maximum hydroxylamine concentration is safety through good operating practices. At high hydroxylamine concentration and nitric acid concentration, there is enough chemical energy as well as reactant species for autocatalytic reactions involving hydroxylamine nitrate with nitrous acid to occur. Nitrous acid is produced from nitric acid through various chemical reactions inherent in aqueous reprocessing. The DOE thus recommends that hydroxylamine nitrate concentration be limited to 2.0M in process [26].

For the MFRF sensitivity study, the DOE recommended in process operating concentrations seem a logical upper bound for hydroxylamine concentration. Thus 0.0M is the lower bound and 2.0M is the upper bound.

2.2.3 Nitric Acid Concentration

Nitric Acid at high concentration in the presence of TBP has been known to cause the formation of red oil. Red oil is formed when an organic solvent containing TBP comes in contact with nitric acid, and it can explosively decompose at high temperatures, potentially damaging reprocessing facilities. It is recommended to keep nitric acid concentrations low to avoid the formation of red oil, but this threshold is far higher than that encountered with the potential for autocatalytic reactions between nitrous acid and hydroxylamine nitrate[27].

For the MFRF sensitivity study, following the DOE recommendations to avoid the autocatalytic reactions with nitrous acid and hydroxylamine nitrate seem logical. Thus 0.0M is the lower bound and 8.0M is the upper bound. Even though 0.0M is the lower limit for nitric acid concentration in the sensitivity study, it should be noted that plutonium can rapidly form polymers at nitric acid concentrations at room temperature with nitric acid concentrations below 0.2M [24]. SEPHIS is unlikely to appropriately model the formation of such polymers.

2.2.4 Inextractable Nitrate Concentration

There appears to be no strict reason to limit the inextractable nitrate ion in process. Of course, there are a number of undesirable operating characteristics that may arise, as a facility might cease to produce product to the desired specification, but there appears to be no safety concern associated with a high inextractable nitrate concentration.

As hydroxylamine nitrate does lose the nitrate ion, the upper bound used in this work is equal to the maximum allowable hydroxylamine concentration, or 2.0M. The lower bound will be 0.0M.

2.2.5 Temperature

While increasing the temperature can be desirable to change the distribution coefficients of the various elements present in nuclear fuel reprocessing, very high temperature can pose dangers both in terms of red oil reactions and autocatalytic reactions of hydroxylamine nitrate and nitrous acid. The latter of these has a lower temperature threshold, and is dependent upon a number of factors. While an operating temperature of 40C might be desirable for separation of certain components, temperatures above 70C are generally regarded as higher than the desired range.

3 Diversion Characterization

The number of ways in which one could remove material for a facility are essentially limitless if the sole constraint is one's imagination. As feasibility and practical concerns are introduced, the problem not only becomes more tractable, but the results of studying the problem are more fruitful. In order to provide any kind of meaningful information regarding the diversion of material from a PUREX reprocessing facility, the problem for the work reported here has been limited in several areas, most notably in the definition of diversion stipulated in this work, the type of adversary characterized, and the type of diversion allowed.

3.1 Diversion Defined

Diversion is the willful removal of a specified amount of fissile material in a specified amount of time by a distinct adversary from a facility handling such material. The key elements to the definition of diversion include

1. The type of fissile material of interest
2. The timeframe of diversion
3. The characteristics of the adversary
4. The type and bounds of the facility in question

3.2 Fissile Material of Interest

The fissile material of interest is plutonium. This material is chosen because it is modeled in SEPHIS, it is readily produced in all types of operating power reactors, it requires no isotopic enrichment to produce a readily fissile material, and it is chemically separable from uranium and the other elements in spent nuclear fuel. The quantity at which diversion occurs is set at eight kilograms because this is the same quantity used by the IAEA as the amount of material necessary for a single nuclear weapon.

3.3 Diversion Timeframe

While it is conceivable that diversion can either be abrupt or protracted, the work reported here examines a diversion that occurs rapidly enough that were the diversion to be detected, it is plausible that the material would have left the facility by the time a coherent response could be effected. In order for this to occur, one would need to have an intimate knowledge of the particular details regarding the operation of a given facility as well as the details regarding any sort of regulatory responses to missing

material. In the absence of such data—which is often protected—it is possible to make guided estimates.

To serve a baseline estimate of the diversion timeline from the model fuel reprocessing facility, there are a number of assumptions that can be made. It is assumed that the facility workers work in three eight hour shifts. Any measurements that need to be analyzed in a laboratory—either for safeguards purposes or for process control purposes—are taken at the beginning and ends of each shift. There is no random sampling of the chemical process.

It is further assumed that a safeguards inspector will not always be at the facility, but that he can appear when necessary. For the purposes of this work, the personality of the safeguards inspector follows two rules:

1. Perturbations in any sensor data taken during the middle of the shift are detected by the safeguards inspector who will arrive at the end of the shift to find out what is happening.
2. Chemical samples taken for analysis are instantly analyzed at the end of the shift with the safeguards inspector present.

In either case, the safeguards inspector will be able to prevent any diversion from continuing once he arrives onsite, but will be unable to prevent or reverse any diversion that has occurred prior to his arrival.

With this set of assumptions, a diversion timeframe of eight hours is assumed, meaning that for a diversion to be successful, the adversary must remove 8kg of plutonium over a period of eight hours or less. While there are a number of legitimate

characterizations of timeframes that may be appropriate and while there are a number of effects not accounted for in this basic assumption, this assumption does reduce the problem of diversion to a very tractable state.

In recognition that the eight hour diversion timeframe might not represent the entire scope of rapid diversions, the work reported here also covers longer intervals all the way up to seventy-two hours. In covering these longer intervals, there is greater flexibility in the assumptions made that can reflect a greater number of possible scenarios.

3.4 Adversary Characterization

The adversary used in this work is considered to be highly capable, technically competent, and possessing an abundance of financial resources. The adversary is assumed to have control over the fuel reprocessing facility in question and is capable of manipulating elements of the process at will.

This type of adversary can be characterized as a nation-state seeking a nuclear weapon but operating its own civilian national fuel reprocessing facility under the eye of an international safeguards agency. In such a scenario, the adversary would not be dealing with a national safeguards agency that imposes stricter materials accounting standards than an international body because such an agency would be expected to be complicit in the government's aims of procuring a nuclear weapon.

Because of the generally very good capabilities of this adversary, the adversary is indifferent to the form of material he obtains through diversion. As long as 8kg of Pu is removed during the specified time period, the adversary considers his diversion a

success. This indifference to fissile material form has the effect of allowing the work to be restricted to the analysis of the first cycle in the model fuel reprocessing facility, as the most relevant differences between the first cycle and subsequent cycles is simply the concentration of the various species in solution.

3.5 Facility Type and Bounds

The facility type in question is a large spent nuclear fuel reprocessing facility that uses the PUREX solvent extraction process. For the purposes of this work, the facility bounds are drawn around the flowsheet, and diversion is assumed to have occurred if fissile material is removed from the process beyond its normal bounds. This is shown in Figure 4: Schematic Flowsheet with Diversion Streams Indicated, where three caution triangles are placed next to each potential diversion stream. Note that diversion is not assumed to occur between stages, nor is it assumed to occur at any of the product streams. The product streams are assumed not to be diversion pathways because the products are still under safeguards.

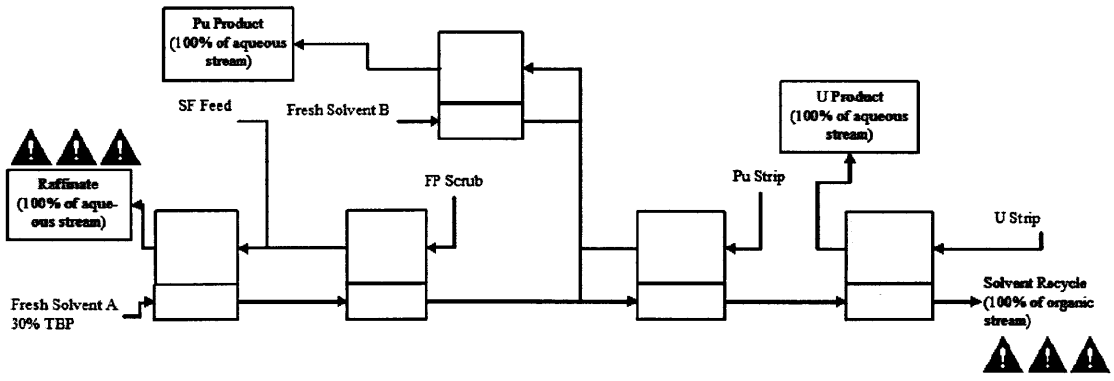

Figure 4: Schematic Flowsheet with Diversion Streams Indicated

This definition of diversion most certainly does not take into consideration the numerous barriers of physical protection, procedural controls, and responses to possible diversion largely because this information is both specific to each individual facility and is not available in the public domain. Truly comprehensive analysis of credible threats and credible diversion scenarios must take these additional barriers into consideration, but such analysis is beyond the scope of the problem at hand. Further, the problem investigated—the removal of Pu from the solvent extraction portion of reprocessing—represents a single layer of defense that if improved to the point of being nearly impregnable will surely improve the overall safety of fissile material from malefactors. This is shown notionally in the diagram below, which represents successful diversion as a serial process.

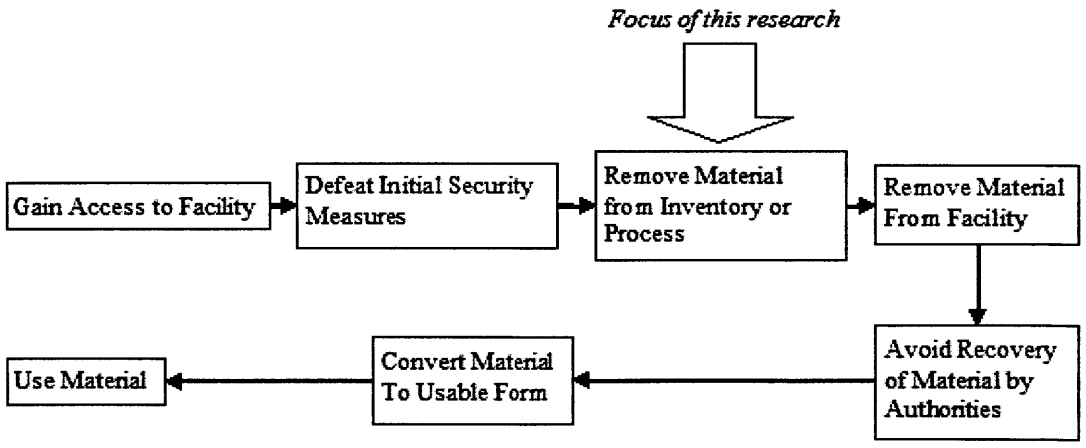

Figure 5: Diversion Process

3.6 Summary

For this study, the definition of diversion is the willful removal of eight kilograms of plutonium in a time period between eight and seventy-two hours by a complicit facility operator, who may be a nation state, from the solvent extraction process of a large spent nuclear fuel reprocessing facility under international safeguards.

4 Diversion Detection

In this work, Bayesian networks are created and used to detect diversion. The creation of the Bayesian network, however, could not be completed without a few manipulations to enable easy simulation of many facility configurations that lead to the capability of generating conditional probability tables. The key enabler for this rapid simulation is the use of stepwise regression analysis.

4.1 Regression Analysis

With the model facility flowsheet and operating parameters defined, inputs are generated for the facility across a total of nineteen manipulable variables. These nineteen manipulable variables are presented in Table 3: Potentially Manipulable Parameters. A set of inputs designed to fill the space of possible inputs allowed under safety constraints described in the previous sections is generated to enable regression analysis. The number of input cases used in this work to generate to enable regression analysis is 220, and all 220 cases are run in SEPHIS.

With the 220 cases being run through SEPHIS, the output data is then imported to JMP, a statistical analysis program, where regressions are fit to the data to more directly map changes in input conditions to changes in output conditions[28]. Fitting

regressions to the data using a stepwise technique to find the least-squares regression yielded near perfect correlations between the input and output conditions as simulated by SEPHIS. The regression equations each have several hundred terms, reflective of the squared and cross-product terms for each of the nineteen variables that could conceivably be manipulated within the safety envelope.

FP Scrub	Flowrate Temperature Nitric Acid Concentration Hydroxylamine Concentration Inextractable Nitrate Concentration
U Strip	Flowrate Temperature Nitric Acid Concentration Hydroxylamine Concentration Inextractable Nitrate Concentration
Pu Strip	Flowrate Temperature Nitric Acid Concentration Hydroxylamine Concentration Inextractable Nitrate Concentration
Fresh Solvent A	Flowrate Temperature
Fresh Solvent B	Flowrate Temperature

Table 3: Potentially Manipulable Parameters

While the regression equation is certainly not of the same form as would be expected from an analytical equation that relies on the theory of solvent extraction, it nonetheless yields results in line with what is given by SEPHIS, which actually does model the chemistry. It is important to note that the primary reason for undertaking this regression analysis is not to discover or model the solvent extraction process for a

general facility; rather it is to enable prediction of the state of the MFRF more quickly than would be possible by simulating the facility configuration in SEPHIS.

Further, with JMP, uncertainty distributions can be associated with each of the variables, and very large numbers of facility configuration runs can be generated to determine the likelihood of various types of diversions occurring.

4.2 Creation of a Bayesian Network

Bayesian networks are used to detect diversion from the Model Fuel Recycling Facility because Bayes' theorem allows for hypotheses to be confirmed or denied as data is gathered and because Bayesian networks can incorporate subjective information and assumptions in a clear way that allows decisions to be made in the absence of less subjective data.

In order to define the scope of the information in the Bayesian network used to detect diversion from the Model Fuel Recycling Facility, it is important to clarify assumptions. Assumptions are made in terms of plausible process manipulations, normal operating conditions, off-normal conditions, the definition of diversion, and the definition of a facility malfunction.

With the assumptions behind the Bayesian network clarified, subjective expertise is used to create the structure of the Bayesian network. The Bayesian networks used are of the diagnostic type. This means that there is a single hypothesis node for which a prior probability must be assumed. This single assumption greatly simplifies the creation of the Bayesian network, as only one prior distribution needs to be assumed as opposed

to many. Beyond being a trick to simplify calculation of Bayesian networks, a diagnostic type network is appropriate, given the direction of causality in the network.

Bayesian networks are directed acyclic graphs with arrows indicating the direction of causality. This network has as the parent node the state of the facility. The facility state is what the operator chooses it to be. This state cannot directly be observed; rather it produces evidence that can be observed. As a result, a facility operator can change the facility state, which then results in a change in the evidence observed. This is the case for using the diagnostic structure for the Bayesian networks described in the work reported here. With the structure clarified, numerous simulations are run to generate information for the conditional probability tables.

4.2.1 Plausible Process Manipulations

The number of manipulable parameters in SEPHIS makes for a needlessly complex problem. In theory there are at least nineteen variables that can be manipulated to affect the PUREX process in a reprocessing facility, but the reality is that many of these variables are much more difficult to manipulate in real-world facilities. These facilities in use are designed to consistently produce a product to rigid specifications, so many measures are undertaken to ensure that the process is consistent across time.

Ensuring consistency of the process across time is enabled in part by the use of make-up tanks. Inside the make-up tanks, chemicals are mixed to their desired concentrations before they are added to the process. This is most notable for the nitric acid and hydroxylamine nitrate, both of which are added to the process at essentially

fixed concentrations. Because these chemicals are added to the process at fixed concentrations, and because these chemicals are coming directly from a make-up tank and not mixed on entry to the process equipment, it would be implausible to assume that a facility operator would be able to cause rapid and wild fluctuations in the concentration of any of these chemicals being added to the process.

Process consistency across time is further ensured by samples being taken at various points for the process and from various make up tanks. This is in line with what one would rationally expect from a facility that makes a very expensive product whose disappearance not only means substantial lost revenue but also possible headaches from the IAEA or other national and international agencies who seek to ensure diversion is not occurring. Samples might be taken from the makeup tanks at the beginning or end of every shift and/or every time the chemicals are re-mixed. These samples would be reviewed by the operator to ensure that the process conditions remain consistent.

The use of make-up tanks and chemical samples largely restrict the variability of process chemicals to that which would be enabled by measurement errors or equipment precision errors, both of which are assumed to be small--within 9%. This is within the generic variability generally suggested by experts [29][30]. Further, were a diverter to alter the concentration of process chemicals, one would expect a step-change in such a concentration.

With a lack of continuous variability from sources other than measurement error or equipment imprecision, the scope of variables within the domain of control of the plant operator is reduced from nineteen to five; the five variables able to be most easily

manipulated by the operator are flowrates of the five input streams excluding the spent fuel stream: Fresh Solvent A, Fresh Solvent B, Fission Product Scrub, Plutonium Strip, and Uranium Strip. The further assumption here is that feed composition remains fixed.

4.2.2 States of full knowledge

Even if a facility is operating under normal conditions, some variation is expected about the nominal configuration due to the precision of controls, measurement error, and other factors that will prevent an exact value from being determined. This condition and state of full knowledge reflects an elimination of all of the epistemic uncertainty of knowledge of the state; further uncertainty is simply aleatory.

In dialogue with experts on reprocessing, it was determined that manipulable process variables would be expected to have standard deviations between 5% and 10% of their nominal value [29][30]. After reviewing data from a test run at the Barnwell facility presented in Figure 3: Flowrate Data from Barnwell Test Run, a standard deviation of 9% is accepted for all variables except for those relating to the income feed stream and the temperature, which are assumed to be fixed. This 9% value is used because it is supported both the Barnwell data as well as expert opinion. For the state of full knowledge, a truncated normal distribution is used because the central limit theorem gives that the mean values for normal operating conditions would tend towards a normal distribution. Truncation occurs because the MFRF is assumed never to operate outside of the limits prescribed in 2.2 Operating Limits.

After the uncertainty distributions set for each of the variables, JMP is used to determine the likelihood of diversion occurring. Under normal operating conditions,

diversion does not occur. This result is consistent with the expectation that a nominally configured reprocessing plant should not be diverting material out of the process erroneously.

4.2.3 State of No Knowledge

For all variables for which no knowledge is assumed, a uniform distribution is used. The uniform distribution is still bounded by the operating limits of the MFRF, but there is no further assumption that is made as to the characterization of the distribution.

If one is assumed to have no knowledge over any of the variables in the facility, a wide range of facility behaviors is possible. The only place in the Bayesian network where states of no knowledge—i.e. uniform distributions across the entire range of an operating parameter—are used is for the non-flowrate parameters of the concentrations of nitric acid, hydroxylamine, and inextractable nitrate . As partial knowledge is gained, the behavior of the facility can quickly be ascertained as new information is gathered. In this way, the use of states of partial knowledge is imperative to the successful detection of diversion from the Model Fuel Recycling Facility.

4.2.4 States of Partial Knowledge

States of partial knowledge are used to detect diversion. If no variable is in a state of no knowledge, then it is either in a state of full knowledge—as represented by a truncated normal distribution reflecting normal operating condition—or it is in a state of partial knowledge. The state of partial knowledge is taken with respect to that of normal knowledge. This is most clearly seen with the flowrates manipulable by the facility operator. Each flowrate has a state of full knowledge, which is represented by a

truncated normal distrubtion, and two states of partial knowledge. The states of partial knowledge indicate flowrates either above or below the normal flowrate, and the flowrates run from the appropriate standard deviation above or below the mean to the respective upper and lower limits for that flowrate. This is illustrated in Figure 6: Distributions associated With States of Knowledge, which shows the State of No Knowledge, the State of Partial Knowledge, and the State of Full Knowledge for the Uranium Strip flowrate.

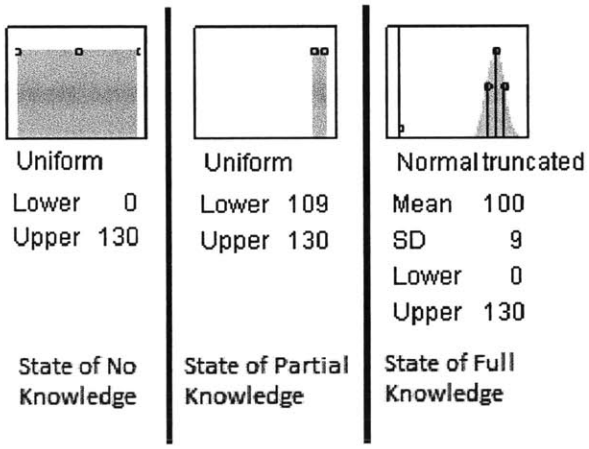

Figure 6: Distributions associated With States of Knowledge

Because the states of partial knowledge are used to indicate the behavior of an adversary, no assumption is made as to what distribution of possible values can be used. While it is expected that a normal distribution will characterize any configuration of the plant as the operator attempts to hold the plant under constant conditions, there is no readily available information as to where in a given operating range a divertor would have the greatest preference for operating. No assumptions are made as to the divertor's preference.

4.2.5 Increasing information and Inference on Facility State

As information is gathered, even if the information is not complete, it is possible to make inferences on the state of a facility. This is illustrated in a largely qualitative sense in Figure 7: Effect of Increasing Information on Facility State. This figure depicts a histogram of the plutonium mass flowrate for each output stream from the first cycle in the MFRF. To create this histogram, 5000 runs are simulated drawing upon possible facility configurations given the information known about the process input parameters; the information known about the process input parameters changes from column (a) to column (c), steadily increasing.

Each output stream has an arbitrarily chosen threshold of 0.5kg/hr drawn and the area below this threshold is shaded grey. Were this threshold to be the accepted threshold for diversion, the probability of diversion given the information at hand could be represented as the fractional area of the histogram above the threshold.

In column (a) the nitric acid concentrations of all input streams with the exception of the feed stream are assumed to be in a state of no knowledge. Column (b) displays the results of simulation when the concentrations of nitric acid in the U Strip and Pu Strip streams are in a state of full knowledge. Coulmn (c) displays the results of simulation when all concentrations of nitric acid are in states of full knowledge.

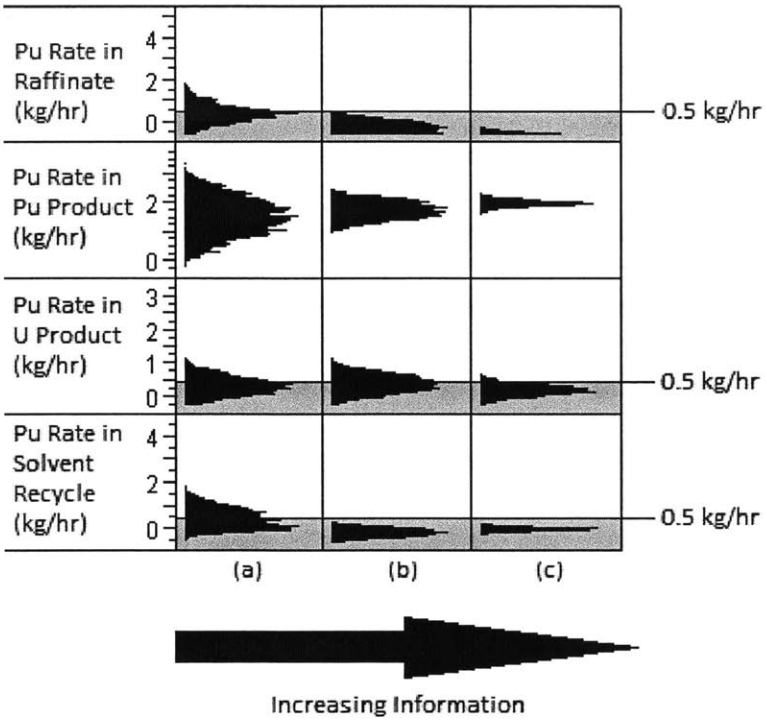

Figure 7: Effect of Increasing Information on Facility State

4.2.6 Structure of Bayesian Network

The Bayesian Network is assumed to have a single hypothesis node. This node reflects the state of the facility, and there are three possible values for this hypothesis node: normal operation, diversion, or malfunction. The single hypothesis node is influenced by each of the plausibly manipulable process parameters each of which can be in a state of full or partial knowledge. The structure of this Bayesian network is deliberately kept simple, as it is a proof of concept model that illustrates the use of Bayesian networks in diversion detection. Were such a network to be used in a real facility, the creation of the network would likely require additional levels of influence.

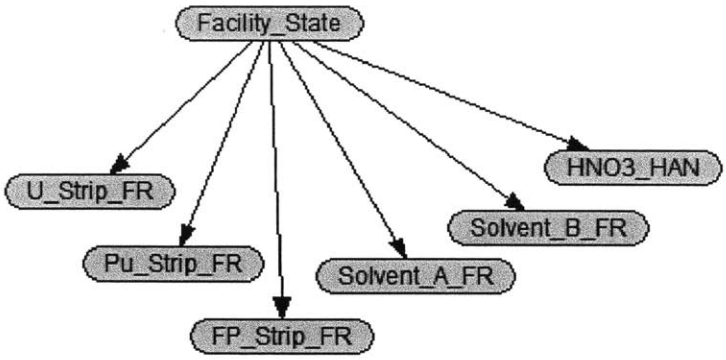

Figure 8: Structure of Bayesian Network

4.2.7 Generation of Conditional Probability Tables

The structure of the Bayesian network and the use of the states of full and partial knowledge is used to create the conditional probability table at each node. The conditional probability table forms the backbone of the Bayesian network as it is run in Netica [31].

4.2.7.1 Manipulable Process Parameter Nodes

Conditional probability tables for the manipulable process parameter nodes are generated by using a combination of JMP and Microsoft Excel. The stepwise regression equations for the facility behavior are used to simulate 5000 different combinations of process inputs according to a given state of the facility. The normal facility configuration is simulated first: feed parameters and temperature are fixed as constant, and all other variables are assumed to be random following a truncated normal distribution. The truncated normal distribution for these other parameters is assumed to have a standard deviation of 9% of the mean and upper and lower bounds as dictated by the facility

operating limits in 2.2 Operating Limits; the variation is in line with the assumptions given in 4.2.2 States of full knowledge.

As departures from the nominal configuration are simulated, only one variable is changed at a time. For example, the Fission Product Strip flowrate would take a uniform distribution reflective of a state of partial knowledge, and all other variables would either remain fixed or follow the truncated normal distribution. For each variable that is changed, another 5000 combinations would be simulated according to the specified distributions on input parameters.

This process is represented for the Fission Product Strip Flowrate in Table 4: Example Conditional Probability Tables. The table on the left gives the number of runs for each set of configurations, and the table on the right gives the probabilities associated. The total of each column is 5000 because 5000 runs are simulated using a given set of distributions. The probabilities for each cell is calculated by taking the number of runs corresponding to the condition in that cell divided by the total number of runs in that cell's row.

FP Strip Flowrate				
		High	Normal	Low
State	Normal	47	1199	1017
	Diversion	65	544	3866
	Malfuncti	4888	3257	117

FP Strip Flowrate				
		High	Normal	Low
State	Normal	2.08%	52.98%	44.94%
	Diversion	1.45%	12.16%	86.39%
	Malfuncti	59.16%	39.42%	1.42%

Table 4: Example Conditional Probability Tables

The state of normal operation is assumed to occur only if neither diversion nor malfunction is occurring. Diversion is assumed to occur if the rate of removal of plutonium exceeded 8kg per n hours, where n reflects a discrete amount of time as discussed in the diversion definition section. Malfunction is assumed to occur if the concentration uranium in any stream falls outside the bounds of normal plant configuration or if the amount of plutonium flowing into the uranium product stream exceeds 8kg per n hours. Plutonium entering the uranium product stream is not considered as diversion because the uranium product stream is assumed to have the same or a similar level of safeguards as the plutonium product streams.

4.2.7.2 Hypothesis Node

In addition to the conditional probability tables at the nodes representing manipulable process parameters, the Bayesian network depends on a conditional probability table for the hypothesis node. This conditional probability is essentially the prior probability of diversion occurring in the facility and is dependent upon subjective expertise.

Five prior distributions are assumed, and each is used in an evaluation of a potential diversion detection scenario. The prior probabilities include a null hypothesis wherein diversion, normal operation, and malfunction are equally likely; levels of competency; and degrees to which the operator will intend to divert plutonium from the facility. This is illustrated in Table 5: Prior Probability of Diversion.

Prior Probabilities on the Likelihood of Diversion			
	Normal	Diversion	Malfunction
No Assumptions	33.40%	33.30%	33.30%
Low diversion proclivity, low competence	45.00%	10.00%	45.00%
Low diversion proclivity, high competence	80.00%	10.00%	10.00%
High Diversion Proclivity, low competence	10.00%	45.00%	45.00%
High Diversion Proclivity, high competence	10.00%	80.00%	10.00%

Table 5: Prior Probability of Diversion

Exploration of the specific factors relating to the prior probability of the likelihood of diversion is beyond the scope of the work reported here, so the various plant operator characterizations are used primarily as illustrative examples of how a Bayesian network can be used to assess the likelihood of diversion.

5 Use of Bayesian Network to Detect Diversion

As information is gathered and fed into the Bayesian network, the likelihood of diversion is updated to reflect the most current information available. As the probability is updated, thresholds can be set at which certain actions should take place. To demonstrate how this works with the Bayesian nework created for the purpose of detecting diversion and distringuishing between diversion and facility malfunction, four cases are used. These cases represent the normal operating condition of the facility, a facility malfunction, diversion through the raffinate stream, and a diversion through the solvent recycle stream.

In all cases, presented in this section, the most basic hypothesis is used: diversion, malfunction, and normal operation are all considered equally likely under the prior probability distribution. As evidence is updated, so, too, is the hypothesis.

5.1 Normal Operating Conditions

When the facility is in a normal operating condition, the summary of its performance is best described by Table 2: MFRF First Cycle Input and Output Flows. In this condition, the facility is assumed to operating at steady state, and no transients are occurring. In this configuration, it is not expected that any diversion should be occurring, nor is there an expectation that any of the products produced would not meet the specifications given them by the facility designer and operator. In a sense, then, the first test of Bayesian network designed to detect diversion is its baseline behavior under the most mundane of conditions.

After all the evidence is gathered from the Bayesian network, the relative likelihood of diversion occurring is given in Table 6: Probability of Diversion in Normal Conditions. All of the Bayesian networks show a decreased probability of diversion from the initial hypothesis. The likelihood of malfunction predicted by the networks, however, increases as the diversion timeframe for which the network is designed also increases. This is largely because smaller changes in any of the flowrates result in changes that could result in a malfunction or diversion scenario of longer time periods.

Diversion Timeframe (hrs)	Normal	Diversion	Malfunction
8	71.50%	28.50%	0.00%
12	99.00%	0.99%	0.00%
16	100.00%	0.00%	0.08%
24	97.50%	0.00%	2.52%
48	78.10%	0.02%	21.90%
72	64.30%	0.34%	35.40%

Table 6: Probability of Diversion in Normal Conditions

5.2 Malfunction Case

The second case in which the Bayesian network is tested is one in which the facility malfunctions. The malfunction case used to test the response of the Bayesian network is a sudden, sharp reduction in the plutonium strip stream. This has the effect of moving the plutonium from the plutonium product stream to the uranium product stream. This condition is most certainly undesirable for a facility operator, but it is not considered diversion because the uranium product stream is still deemed to be under safeguards, as this product stream is a recognized fissile material pathway.

The malfunction itself is caused by reducing the plutonium strip flow rate from 14.0L/min to 5.0L/min. This kind of malfunction might accompany an air lift failure, or perhaps even an operator error. The malfunction is simulated in SEPHIS and is graphically represented in Figure 9: MFRF Malfunction Case. The facility malfunction is assumed to start at zero time on the graph and persist until twenty-four hours, at which time the normal plutonium strip flow rate is restored. This graph displays the rate at which plutonium enters the uranium product stream as well as the total amount of plutonium that leaves the first cycle through the uranium product stream.

In assessing the ability of the Bayesian network to detect this malfunction and discriminate between the malfunction and diversion, the most sensitive Bayesian network—that is the one designed to detect a diversion of 8kg occurring over 72 hours or less—best identifies the reduction of the plutonium strip stream as a malfunction instead of diversion or normal operation. The results of collecting a single piece of

information—that of the plutonium strip flowrate—compared to collecting all input flowrates as evidence are shown in Table 7: Probability of Diversion in Malfunction Case.

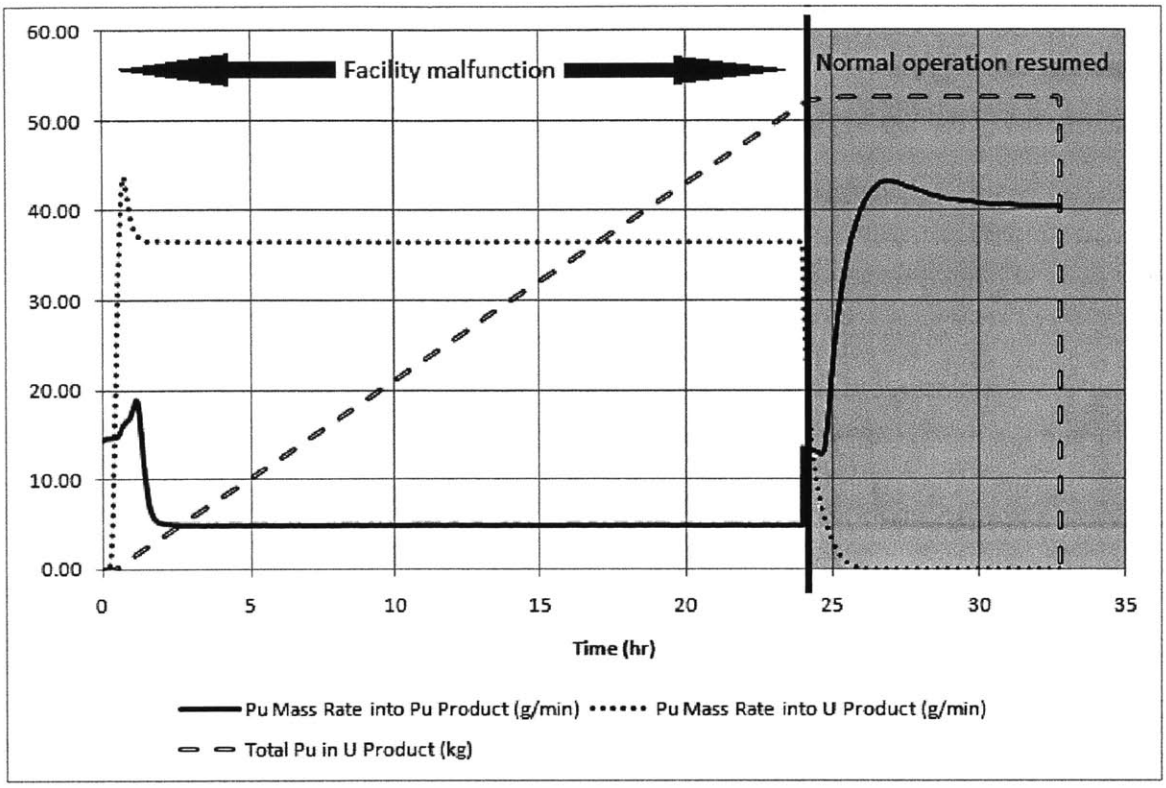

Figure 9: MFRF Malfunction Case

	Pu Strip Flowrate Only			All Evidence		
Diversion Timeframe (hr)	Normal	Diversion	Malfunction	Normal	Diversion	Malfunction
8	11.70%	22.30%	66.00%	51.40%	48.60%	0.00%
12	10.20%	22.80%	67.00%	97.20%	2.77%	0.00%
16	7.65%	24.20%	68.10%	99.40%	0.00%	0.58%
24	29.30%	15.80%	54.90%	90.20%	0.00%	9.76%
48	2.25%	4.49%	93.30%	7.72%	0.00%	92.30%
72	1.52%	8.58%	89.90%	3.41%	0.10%	96.50%

Table 7: Probability of Diversion in Malfunction Case

5.3 Diversion Through Raffinate

The first diversion scenario in which the Bayesian network's ability to detect diversion is assessed is the case of diverting plutonium through the aqueous raffinate stream; this is the same stream in which most of the fission products end up, so the divertor would need to separate the plutonium from the fission products. As defined for the work reported here, however, the adversary is indifferent to the solution containing the plutonium.

To cause this scenario, the diverter simply reduces the fresh solvent flow rate while holding all other flowrates constant; Fresh Solvent A flowrate is reduced from 65.0 L/min to 30.0L/min. The facility is assumed to be in steady state at the beginning of the diversion, allowed to return to steady state at the reduced fresh solvent flow rate, and then the fresh solvent flowrate is returned to its normal value. This scenario is simulated in SEPHIS and is graphically represented in Figure 10: Raffinate Diversion Scenario.

The diversion lasts 294 minutes—just shy of five hours and just long enough to allow the first cycle in the plant to re-stabilize after being perturbed by a sudden reduction in the Fresh Solvent A flowrate. During this time a total of 8.02kg is removed from the process. As the process tends towards achieving equilibrium after the diversion, plutonium continues to flow out the raffinate stream at a rate of more than 1g/min for an additional 26 minutes.

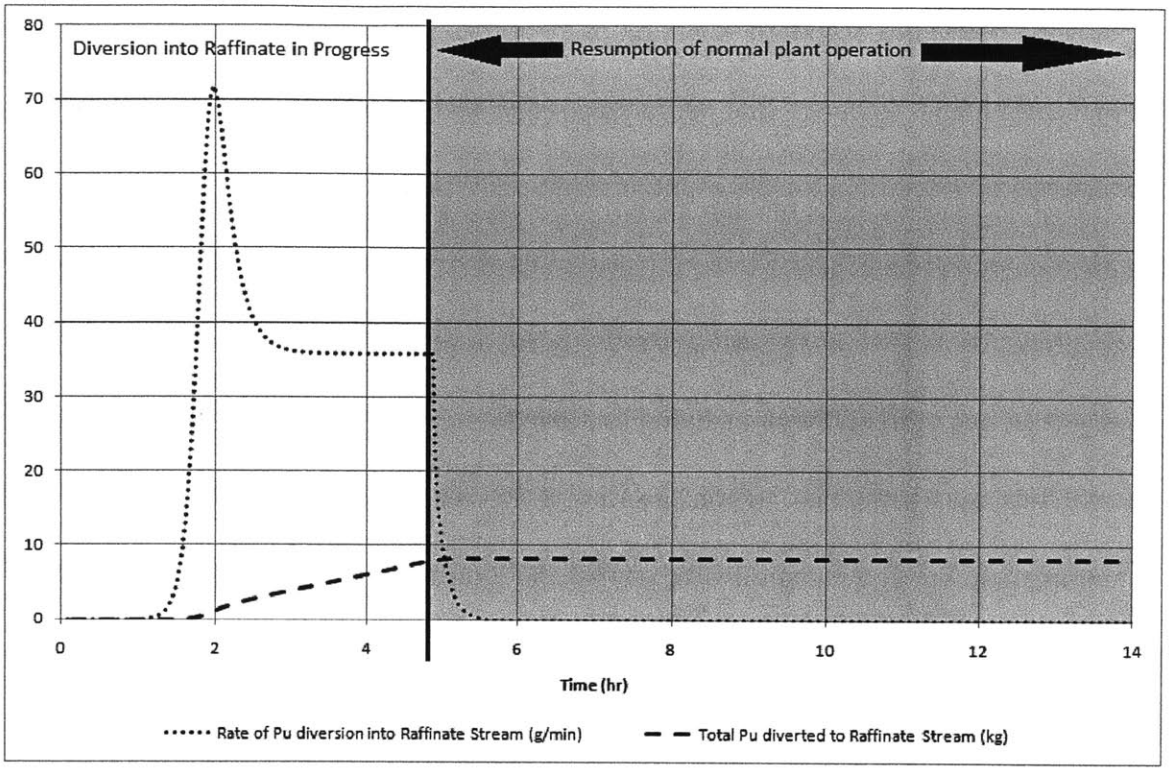

Figure 10: Raffinate Diversion Scenario

As information is acquired, it is sent to the Bayesian network. There are multiple sets of conditional probability tables allowing the Bayesian network to actually work; these tables are included in Appendix B: Conditional Probability Tables. The effect of gathering and feeding evidence to the Bayesian network designed to detect diversion of 8 kilograms of plutonium in eight hours or less is illustrated in Figure 11: Bayesian Updating of Eight Hour Network. For this illustration, the null assumption is used for the hypothesis node, giving equal probabilities to normal operation, diversion, and malfunction. In this figure, the network is represented three times. In each representation, the nodes are given as boxes with belief bars. The grey boxes indicate that a certain finding has been made. Network (a) illustrates the finding of Fresh Solvent

A being below one standard deviation of its normal flowrate. At this time, the network indicates a 66.9% chance that malfunction is occurring and a 22.4% chance that diversion is occurring. The moment an additional finding is entered—in this case that the Fission Product Scrub flowrate is within its normal range—the likelihood of malfunction is seriously reduced. This is shown in network (b). Network (c) shows all of the aqueous stream flowrates being found to be normal. It is no surprise to note that with this set of evidence, the facility state is assumed to NOT be malfunction. What is interesting, but again unsurprising, is that the indicated likelihood of diversion has actually decreased; however, it is still noticeably greater than the value present in the initial hypothesis, which would warrant some concern and perhaps a more in-depth verification.

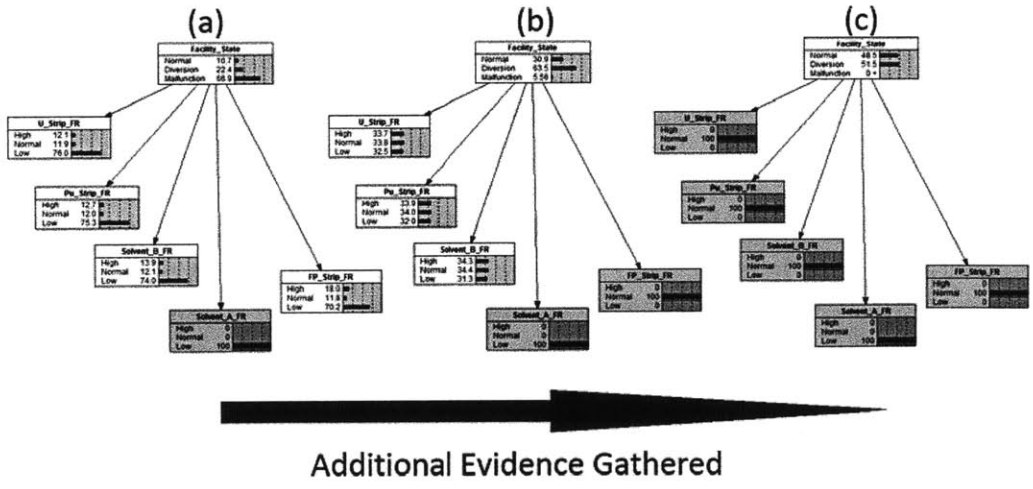

Figure 11: Bayesian Updating of Eight Hour Network

The findings for the case of a diversion into the raffinate stream are presented in more detail in Table 8: Probability of Diversion in Raffinate Scenario. As in the case of normal operation, the more sensitive networks over-represent the likelihood of malfunction. What is interesting to note is that the network most capable of detecting this diversion scenario is the network designed for diversion occurring over twelve hours or less. That this is the case might suggest that there is an optimum level of sensitivity that can and should be sought after when developing the conditional probability tables that allow a Bayesian network to be run.

	Only Fresh Solvent Flowrate			All Evidence		
Diversion Timeframe (hr)	Normal	Diversion	Malfunction	Normal	Diversion	Malfunction
8	10.70%	22.40%	66.90%	48.50%	48.50%	0.00%
12	7.60%	47.50%	44.90%	25.60%	74.40%	0.00%
16	9.27%	53.30%	37.40%	99.40%	0.36%	0.22%
24	12.20%	65.10%	22.70%	92.10%	0.00%	7.91%
48	24.40%	64.50%	11.00%	84.60%	0.38%	15.00%
72	31.10%	57.40%	11.50%	77.60%	3.12%	19.30%

Table 8: Probability of Diversion in Raffinate Scenario

5.2 Second Case: Diversion through Solvent Recycle Stream

The second diversion scenario used to assess the Bayesian network's ability to detect diversion from the MFRF is much more complex than the first scenario because a diversion through the solvent recycle stream requires the manipulation of multiple input flowrates in order to remove at least 8kg over a eight hours or less.

This diversion scenario is caused by allowing the plutonium to migrate to the organic phase from the feed while disallowing it to be stripped from the organic solvent. In this scenario, the only variables manipulated are flow rates; concentrations of nitric acid and

the reductant used are held constant. This has the effect of holding the distribution coefficients constant, meaning that the diversion is executed through simply restricting the mass of plutonium allowed to enter the aqueous phase downstream of the stage at which the fission product scrub is introduced.

For this diversion scenario, the overall flowrates of the organic streams are increased while the aqueous stream flowrates are decreased. The scenario is allowed to run for thirty hours with the input parameters indicated by Table 9: MFRF Configuration in Solvent Recycle Diversion.

Solvent Recycle Diversion Flowrates (L/min)			
Facility State	*Normal*	*Diversion*	*Normal*
Time (h)	**<0**	**0-24**	**>24**
U Strip	100.00	5.00	100.00
Pu Strip	14.00	5.00	14.00
FP Scrub	10.00	10.00	10.00
Solvent A	65.00	84.05	65.00
Solvent B	15.00	19.50	15.00

Table 9: MFRF Configuration in Solvent Recycle Diversion

A simulation of the solvent recycle diversion is shown in Figure 12: Solvent Recycle Diversion Scenario. During the diversion, plutonium is removed at a rate of approximately 37 g/min once the facility re-acquires balance following the abrupt manipulation of flowrates. Over the course of this scenario, a total of more than 50kg of plutonium is removed from the solvent extraction process.

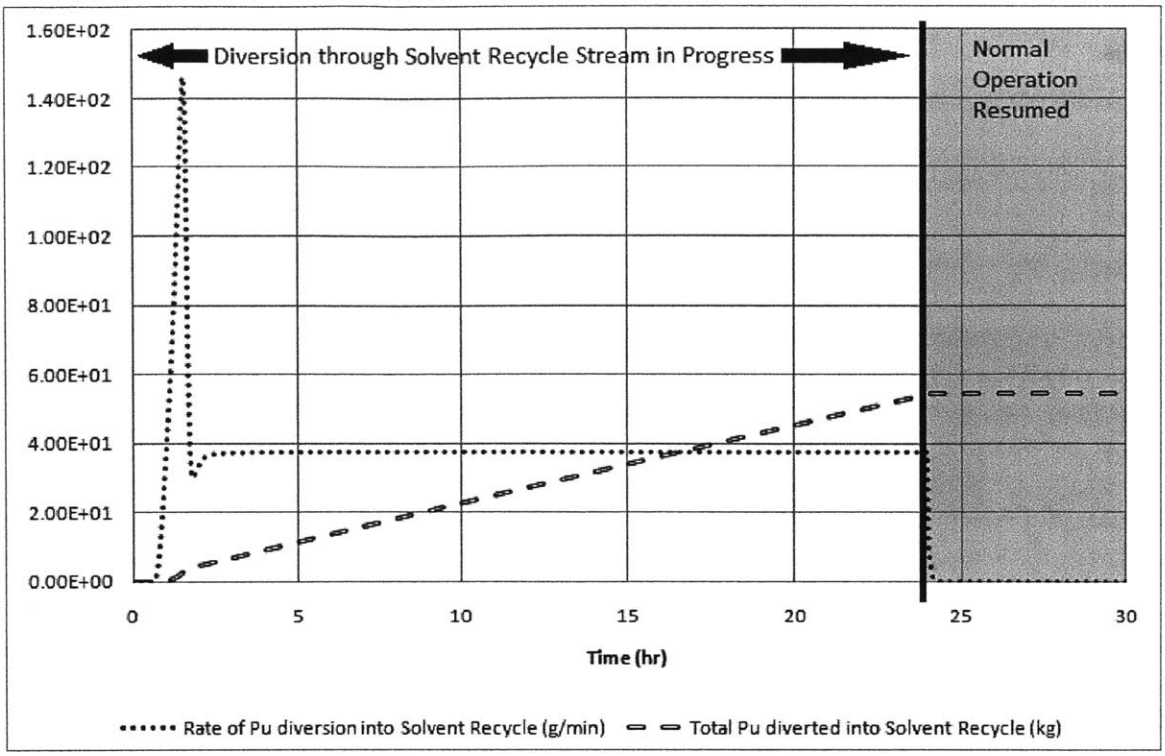

Figure 12: Solvent Recycle Diversion Scenario

As information is acquired and added to the Bayesian networks, the Bayesian networks largely fail to recognize that diversion is occurring through the solvent recycle stream. In fact, if a complete set of flowrate evidence is gathered for the solvent recycle diversion scenario, and the adversary is assumed to be predisposed to diversion with a very high level of competence, most of the Bayesian networks still predict that diversion is not occurring. Instead, the result is that the hypothesis of facility malfunction is asserted with great certainty. This is shown for the Bayesian network designed to detect diversion occurring in seventy-two hours or less in Figure 13: Solvent Recycle Diversion in Bayesian Network.

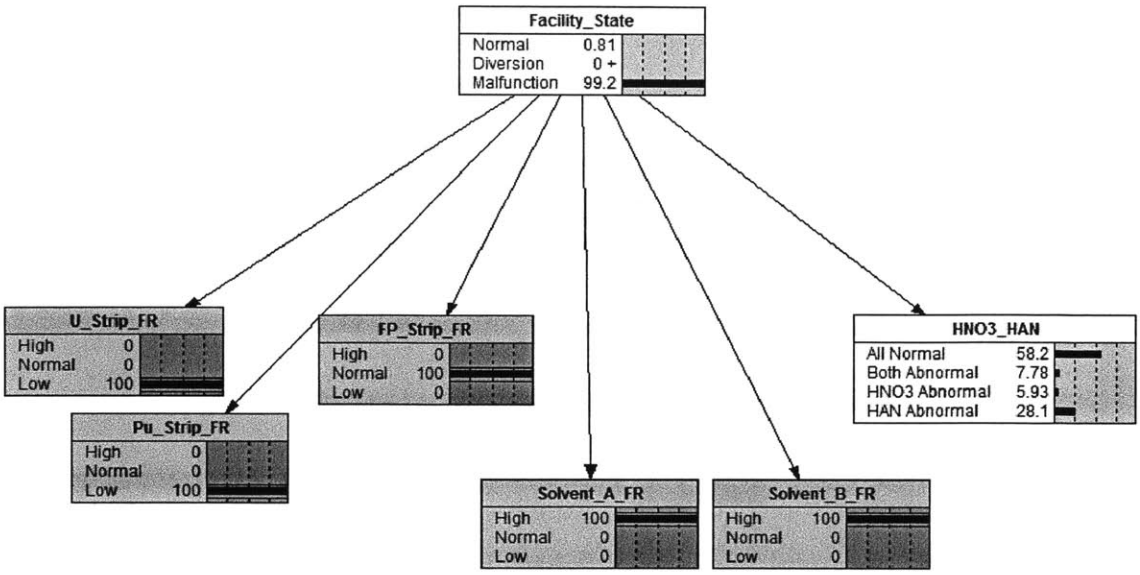

Figure 13: Solvent Recycle Diversion in Bayesian Network

More complete results for the networks designed to detect diversion over varying timescales are shown in Table 10: Probability of Diversion in Solvent Recycle Scenario. In this case, the Bayesian network designed to capture diversion occurring on timescales of eight hours or less has a clear, distinct, and large advantage over the other networks in detecting diversion.

	Fission Product Scrub Excluded			All Evidence		
Diversion Timeframe (hr)	Normal	Diversion	Malfunction	Normal	Diversion	Malfunction
8	31.80%	67.40%	0.83%	32.60%	67.40%	0.02%
12	68.60%	4.65%	26.80%	91.10%	5.85%	3.01%
16	11.30%	0.01%	88.70%	36.40%	0.00%	63.60%
24	2.03%	0.00%	98.00%	4.11%	0.00%	95.90%
48	0.77%	0.00%	99.20%	1.08%	0.00%	98.90%
72	0.61%	0.00%	99.40%	0.81%	0.00%	99.20%

Table 10: Probability of Diversion in Solvent Recycle Scenario

5.5 Analysis of Bayesian Network Performance in Diversion Detection.

The performance of the Bayesian networks developed in the conduct of this work leaves a lot to be desired. With more complicated diversion scenarios being missed and other facility events being inappropriately identified, it is unclear that this tool would provide much value to the user at this moment. As a starting point for future tools, however, lessons can be learned.

In detecting diversion scenarios over a longer time period, it is necessarily the case that the process used to detect these diversions will be more sensitive to small and subtle process manipulations. Balancing this sensitivity with the ability to get useful information most definitely requires further work and clarified assumptions. Using the method of generating the conditional probability tables described in 4.2.7 Generation of Conditional Probability Tables results in over-representing certain conditions and under-representing others. For example, over long diversion time possibilities, malfunction is over-represented because plutonium mass rate thresholds are tightened, and over short diversion time possibilities diversion is over-represented because there are relatively few malfunction conditions.

Part of the reason for this inappropriate level of representation lies in the assumptions used. The default assumption of uniform distributions across the permissible operating range as outlined in 2.2 Operating Limits results in under-sampling a sufficient number of process variables as to indicate normal operation is impossible, which is clearly not a correct finding. At the same time, a normal distribution might not be appropriate for all scenarios including diversion scenarios because the

criteria a diverter uses to assess the desirability of a given configuration is unknown and plausibly dependent upon each potential diverter.

Reprocessing facilities are designed to handle a variety of feed compositions and as such, for a fixed feed composition, the space of diversion or misuse cases is naturally much larger than the space of normal and proper operation. As such, when formulating a Bayesian network, a measure of subjective expertise is required to ensure the various components are give the appropriate weight. This appropriate weighting could be done through a refinement of prior probabilities, or it could be done through a refinement and improvement on the types of distributions and bounds on distributions used to model states of partial knowledge.

6 Conclusions

Bayesian networks can be generated to indicate a likelihood that diversion is occurring in a given fuel reprocessing facility. The application of sophisticated and rigorous Bayesian networks to fuel recycling facilities is new. The networks created in the conduct of this work represent formalizing a set of assumptions and a way of thought that, while far from perfect, offers a starting point for future work in the field.

Diversion of fissile material by a malefactor is not something that people of goodwill would like to see. In order to prevent this from happening, full intellectual weight must be brought to bear on this problem of preventing such a rare event from occurring. As the frequency of diversion is sufficiently small as to render good data hard, if not impossible to find, a very promising alternative is to systematically collect, integrate,

and use subjective expertise in a way that leads to the ability to make a decision to either take an action to stop diversion or to better spend resources on other measures that have a greater positive impact.

The Bayesian network used to detect diversion at the Model Fuel Recycling Facility is both proof that diversion detection can be done with a Bayesian network and that it is not a trivial problem to do it well. This same network relies upon simulation of a facility to obtain more complete information through the use of simulation within a set of assumptions than perhaps direct inquiry of experts could provide. Nevertheless, even this process is not without its difficulties; this process affords many opportunities for future work.

6.1 Future Work

The Bayesian networks used in the course of conducting this work are clearly not perfect. The work going into these networks needs to be refined on a number of levels. These are discussed below:

6.1.1 Sampling of Variables and Adversary Preference

Adding details to an adversary characterization such as preferences for certain actions over others will allow for better sampling of variables to inform the conditional probability tables. As these tables are calculated for this work by one-at-a-time manipulation of variable distribution, certain combination effects are missed, as is seen in the Solvent Recycle Diversion Scenario. If the adversary can be characterized based on real information, the resulting Bayesian network is sure to be more useful.

6.1.2 Open-source Solvent Extraction of Fuel Reprocessing Facility Software

SEPHIS-MOD4 is used to generate the data that is then fit to a stepwise regression as a function of twenty-four variables. While the stepwise regression has a very distinct advantage in having a very high speed at which large numbers of facility configurations can be simulated, there is some loss of data fidelity compared to the same type of simulation using an analytic tool such as SEPHIS-MOD4. Additionally, having been released in 1979, SEPHIS-MOD4 lacks many of the features that make it easy to specify distributions on the process variables. Such features present in a more modern piece of software with greater ease of use would surely spur open work in this field.

A more modern piece of software, a better characterized adversary, and a distilled summary of expert opinion could also be used to determine whether diversion could be induced through a number of short-lived changes to the solvent extraction process; this could be due to a number of effects such as solute reflux. This is an interesting problem, but potentially very difficult to model.

6.1.3 Interpretation of results of Updated Hypotheses

The focus of the work reported here is creating a proof-of-concept Bayesian network to detect diversion. Necessarily neglected is what to do when there is evidence of an increased likelihood of diversion. Determination of the cost of verifying to avoiding consequences as compared to the cost of the consequences could make for interesting future work in the field.

6.3 Possible Applications

As the use of Bayesian networks or similar tools grows in this area, it is possible that such use can reduce the cost burden to facility operators of complying with safeguards, international or domestic. Depending on exactly how a safeguards regime is implemented, the use of Bayesian networks could potentially reduce or even eliminate the need for a resident inspector so long as the capability of being able to quickly react to a potential diversion is maintained. The reduction of costs by pursuing this application are unclear, but also an area worthy of further investigation.

Bibliography

[1] Gretchen Hund, "A role for industry in promoting nuclear security and nonproliferation," *Nuclear News*, November 2009.

[2] G. Selvaduray, M. Goldstein, and N. Anderson, "Review of Reprocessing Technologies," *Conservation and Recycling*, vol. 3, December 1979.

[3] Murdoch Mackenzie. (2011, May) Cognis. [Online]. http://www.cognis.com/NR/rdonlyres/62A4BDA0-2B5F-4579-9761-968114B57A2A/0/thesolve.pdf

[4] Justin Long, *Engineering for Nuclear Fuel Reprocessing*, 2nd ed. La Grange Park, IL, United States: American Nuclear Society, 1978.

[5] Manson Benedcit, Thomas Pigford, and Hans Wolfgang Levi, *Nuclear Chemical Engineering*, 2nd ed. United States of America: McGraw-Hill, 1981.

[6] J.D. Law and T.A. Todd, "Liquid-Liquid Extraction Equipment," Idaho National Laboratory, Idaho Falls, ID, INL/CON-08-15151, 2008.

[7] John Krebs and Monica Regalbuto, Private Communication, February 8, 2010.

[8] A.D. Mitchell, "SEPHIS-MOD4: A User's Manual to a Revised Model of the Purex Solvent Extraction System," Oak Ridge National Laboratory, Oak Ridge, TN, ORNL-5471, 1979.

[9] Edward Kyser, "Valdiation of the SEPHIS Program for the Modeling of HM Process," Westinghouse Savannah River Company, Aiken, SC, WSRC-TR-98-00376, 1998.

[10] R.J. Brouns, L.C. Davenport, and G.L. Richardson, "Calculating the Inventory of Solvent Extraction Columns for Material Balances Without Shutdown," Pacific Northwest Laboratory, Richland, WA, Presentation at INMM 1981 PNL-SA--9360, 1981.

[11] Alfred Schneider and Roger Carlson, "Modeling of Fissile Material Diversion in Solvent Extraction Cascades," Georgia Institute of Technology, Atlanta, GA, UCRL-15243, 1980.

[12] Tom Burr and Larry Wangen, "Process Fault Detection and Nonlinear Time Series Analysis for Anomaly Detection in Safeguards," Los Alamos National Laboratory, Los Alamos, NM, Paper for Presentaion at IAEA Symposium, 1994 LA-UR-04-0171, 1994.

[13] Tom Burr, James Jones, and Larry Wangen, "Multivariate Diagnostics and Anomaly Detection for Nuclear Safeguards," Los Alamos National Laboratory, Los Alamos, NM, Paper for Presentation ant INMM 1994 LA-UR-04-2292, 1994.

[14] Xiaoyan Zeng, Mihai Anitescu, Candido Pereira, and Monica Regalbuto, "A Framework for Chemical Plant Safety Assessment under Uncertainty," Argonne National Laboratory, Argonne, IL, ANL/MCS-P1546-0908, 2010.

[15] Benjamin Cipiti and Lawrence Ricker, "Advancing the State of the Art in Materials Accountancy through Safeguards Performance Modeling," Sandia

National Laboratories, Albuquerque, NM, SAND2008-5100, 2008.

[16] Benjamin Cipiti, Valmor de Almeida, Ian Gauld, Joseph Birdwell, and David DePaoli, "Coupling a Transient Solvent Extraction Module with the Separations and Safeguards Performance Model," Oak Ridge National Laboratory and Sandia Natinoal Laboratories, Oak Ridge, TN, ORNL/TM-2009/205, 2009.

[17] F. Caccavale, F. Pierri, M. Iamarino, and V. Tufano, "An integrated approach to fault diagnosis for a class of chemical batch processes," *Journal of Process Control*, vol. 19, pp. 827-841, November 2009.

[18] Biao Huang, "Bayesian methods for control loop monitoring and diagnosis," *Journal of Process Control*, vol. 18, pp. 829-838, 2008.

[19] Thomas Nielsen and Finn Jensen, "Alert Systems for Production Plants: A Methodology Based on Conflict Analysis," *ECSQARU*, pp. 76-87, 2005.

[20] Allan James, Samantha Low Choy, and Kerrie Mengersen, "Elicitator: An expert elicitation tool for regression in ecology," *Environmental Modelling and Software*, vol. 25, pp. 129-145, 2010.

[21] L.R Hope, A.E. Nicholson, and K.B. Korb, "Knowledge Engineering Tools for Probability Elicitation," Monash University, Victoria, Australia, Paper published to website http://www.csse.monash.edu.au/publications/2002/tr-2002-111-full.ps, 2002.

[22] John Bennett and Adolph Beyerlein, "Nuclear Material Inventory Estimation in a Nuclear Fuel Reprocessing Facility," *Nuclear Science and Engineering*, vol. 80, pp. 313-321, 1982.

[23] K.K.S. Pillay, R.R. Picard, and R.S. Marshall, "Estimation Methods for Process Holdup of Special Nuclear Materials," Los Alamos National Laboratory, Los Alamos, NM, NUREC/CR-3678 LA-10038, 1984.

[24] Vernon Schuelein, "Parameters for Plutonium Polymer Formation in Nitric Acid," Atlantic Richfield Hanford Company, Richland, WA, ARH-SA-233, 1975.

[25] H.A. Dayem, A.L. Baker, D.D Cobb, E.A. Hakkila, and C.A. Ostenak, "Demonstrations of Near-Real-Time Accounting: The AGNS 1980-81 Miniruns," Los Alamos National Laboratory, Los Alamos, NM, Technical Report Data LA-9942, 1984.

[26] Donald Harlow et al., "Technical Report on Hydroxylamine Nitrate," U.S. Department of Energy, DOE/EH-0555, 1998.

[27] Randall Robinson, David Gutowski, and William Yeniscavich, "Control of Red Oil Explosions in Defense Nuclear Facilities," Defense Nuclear Facilities Safety Board, Washington, D.C., DNFSB/TECH-33, 2003.

[28] SAS Institute Inc., JMP 8, 2010, Software available from http://www.jmp.com.

[29] Mike Ehinger, Private Communication, March 2, 2011.

[30] Monica Regalbuto, Private Communication, March 3-4, 2011.

[31] Norsys Software Corporation, Netica 4.16, 2010, Software available from http://www.norsys.com/.

Appendix A: SEPHIS Calculations Pertaining to the MFRF

This appendix contains the output from SEPHIS regarding several calculations. In many but not all cases, the time-dependent data from SEPHIS is suppressed in its output for the sake of brevity in this appendix; inclusion of all time-dependent data would greatly increase the length of this appendix beyond what is warranted.

A.1 MFRF in steady-state, normal configuration

```
1CALCULATIONS FOR A SOLVENT EXTRACTION PROCESS HAVING INTERACTING SOLUTES


 GENERATED PROFILE
 EXECUTION OF THIS FILE WILL YIELD THE RESULTS OF THE MFRF BEING
 IN THE NORMAL OPERATING CONFIGURATION FOR THE FIRST UREX CYCLE.
 DLHETA =   1.000 MINUTES PER TIME INCREMENT
 DPRINT = 5001.000 MINUTES WEIWEEN PRINTING OF PROFILES
 IFAST  = 0  THE RUNGE-KUTTA INTEGRATION WILL BE USED
 THIS TIME PERIOD WILL END WHEN TIME = TSTOP = 1000.000 MINUTES OR A TOLERANCE OF TOL =  0.0100 % PER MINUTE IS REACHED
 NUMBER OF STAGES =  45
 NEWIN  = 1 NEW INPUT FLOWS WILL BE GIVEN
 NEWOUT = 1 NEW OUTPUT FLOWS WILL BE GIVEN
 NEWOUT =  1 INVALID VALUE
 IVOLM = 3 MIXER VOLUMES DETERMINED BY PHASE FLOW
 IVOLS = 3 SETTLE VOLUMES GIVEN BY PHASE FLOW
 IPRO   = 0 A NEW INITIAL PROFILE WILL NOT BE READ
 IPNCH = 0   NO PUNCHED CARD OUTPUT
 NSTR  = 1   ROUTING PATTERN OTHER THAN NORMAL
 ORGANIC STREAM EXITING AT STAGE  35 FEEDS STAGE  23
 TEMPI  = 2.500E+01  INITIAL & DEFAULT TEMPERATURE
 IRXN   = 3 REDUCTION OF PLUTONIUM BY HYDROXYLAMINE
 FEED & PRODUCT      STAGE  NITRIC ACID    URANIUM       PU (IV)       PU (III)      REDUCTANT     NITRATE ION   FLOW RATE      TEMP
 STREAM DATA           NO.    (MOL/L)       (G/L)         (G/L)         (G/L)         (MOL/L)       (MOL/L)       (L/MIN)        (C)
            AQUEOUS    1    3.000E-02    0.000E+00     0.000E+00     0.000E+00     0.000E+00     0.000E+00     1.000E+02     25.0
            AQUEOUS   13    3.000E-01    0.000E+00     0.000E+00     0.000E+00     7.000E-02     7.000E-02     1.400E+01     25.0
          30.0 % TBP  34    0.000E+00    0.000E+00     0.000E+00     0.000E+00     0.000E+00     0.000E+00     1.500E+01     25.0
            AQUEOUS   35    2.000E+00    0.000E+00     0.000E+00     0.000E+00     0.000E+00     0.000E+00     1.000E+01     25.0
            AQUEOUS   39    1.250E+00    2.850E+02     3.000E+00     0.000E+00     0.000E+00     3.000E-02     1.410E+01     25.0
          30.0 % TBP  45    0.000E+00    0.000E+00     0.000E+00     0.000E+00     0.000E+00     0.000E+00     6.500E+01     25.0
            AQUEOUS   12    PRODUCT STREAM REMOVED (FLOW RATE IN  MOLAL UNITS)                                  5.000E+03
            AQUEOUS   34    PRODUCT STREAM REMOVED (FLOW RATE IN  MOLAL UNITS)                                  5.000E+03
```

STAGE	MIXER VOLUME BY PHASE		SETTLER VOLUME BY PHASE		MIXER FLOW RATE		INTERSTAGE FLOW RATE	
NO.	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC
1	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
2	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
3	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
4	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
5	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
6	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
7	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
8	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
9	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
10	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
11	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
12	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	0.000E+00	7.931E+01
13	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01

14	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
15	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
16	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
17	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
18	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
19	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
20	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
21	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
22	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
23	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
24	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
25	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
26	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
27	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
28	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
29	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
30	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
31	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
32	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
33	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
34	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	0.000E+00	1.487E+01
35	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
36	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
37	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
38	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
39	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
40	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
41	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
42	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
43	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
44	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
45	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01

TRANSIENT BEHAVIOR RESULTS MIXER CONCENTRATIONS GIVEN

TIME = 0.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
7	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
8	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
9	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
12	PRODUCT STREAM						\	9.991E+01	
13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
25	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
30	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
31	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
32	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
33	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
34	PRODUCT STREAM						\	1.384E+01	
35	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.382E+00	2.500E+01
36	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.382E+00	2.500E+01
37	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.382E+00	2.500E+01
38	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.382E+00	2.500E+01
39	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
40	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
41	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01

42	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
43	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
44	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
7	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
8	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
9	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
25	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
30	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
31	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
32	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
33	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
35	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
36	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
37	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
38	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
39	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
40	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
41	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
42	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
43	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
44	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02

TIME = 526.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	3.000E-02	2.527E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
2	3.000E-02	9.490E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
3	3.000E-02	3.472E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
4	3.000E-02	1.269E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
5	3.000E-02	4.640E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
6	3.001E-02	1.694E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
7	3.014E-02	5.991E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.981E-01	1.000E+02	2.500E+01
8	3.068E-02	1.308E+00	1.946E-14	0.000E+00	0.000E+00	0.000E+00	9.998E-01	1.000E+02	2.500E+01
9	3.126E-02	7.780E+00	3.655E-13	0.000E+00	0.000E+00	0.000E+00	1.009E+00	1.002E+02	2.500E+01
10	3.154E-02	1.852E+01	2.711E-12	0.000E+00	0.000E+00	0.000E+00	1.023E+00	1.006E+02	2.500E+01
11	3.293E-02	2.936E+01	1.340E-11	0.000E+00	0.000E+00	0.000E+00	1.038E+00	1.009E+02	2.500E+01
12	5.420E-02	3.818E+01	5.425E-11	0.000E+00	0.000E+00	0.000E+00	1.051E+00	1.013E+02	2.500E+01
12	PRODUCT STREAM							\ 1.013E+02	
13	3.143E-01	2.908E+01	1.275E-10	1.670E-06	6.934E-02	6.934E-02	1.060E+00	1.413E+01	2.500E+01
14	3.532E-01	3.148E+01	5.345E-07	7.108E-03	6.918E-02	6.921E-02	1.065E+00	1.416E+01	2.500E+01
15	4.132E-01	2.926E+01	2.098E-03	2.422E-01	6.811E-02	6.912E-02	1.065E+00	1.418E+01	2.500E+01
16	4.931E-01	2.563E+01	6.336E-02	1.124E+00	6.432E-02	6.902E-02	1.064E+00	1.420E+01	2.500E+01
17	5.899E-01	2.214E+01	2.663E-01	2.046E+00	6.032E-02	6.888E-02	1.064E+00	1.423E+01	2.500E+01
18	7.057E-01	1.898E+01	4.454E-01	2.564E+00	5.796E-02	6.869E-02	1.065E+00	1.427E+01	2.500E+01
19	8.430E-01	1.596E+01	4.893E-01	2.784E+00	5.680E-02	6.845E-02	1.066E+00	1.432E+01	2.500E+01
20	1.002E+00	1.316E+01	4.409E-01	2.854E+00	5.623E-02	6.817E-02	1.067E+00	1.438E+01	2.500E+01
21	1.183E+00	1.073E+01	3.628E-01	2.866E+00	5.583E-02	6.783E-02	1.070E+00	1.445E+01	2.500E+01
22	1.387E+00	8.696E+00	2.881E-01	2.859E+00	5.547E-02	6.743E-02	1.074E+00	1.453E+01	2.500E+01

23	1.617E+00	7.043E+00	2.263E-01	2.842E+00	5.507E-02	6.696E-02	1.080E+00	1.463E+01	2.500E+01
24	1.641E+00	4.613E-01	4.254E-02	2.846E+00	5.515E-02	6.706E-02	1.071E+00	1.461E+01	2.500E+01
25	1.643E+00	2.785E-02	7.375E-03	2.847E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
26	1.643E+00	1.672E-03	1.272E-03	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
27	1.643E+00	1.004E-04	2.192E-04	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
28	1.643E+00	6.028E-06	3.779E-05	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
29	1.643E+00	3.620E-07	6.512E-06	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
30	1.641E+00	2.177E-08	1.119E-06	2.845E+00	5.517E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
31	1.637E+00	1.314E-09	1.892E-07	2.845E+00	5.518E-02	6.708E-02	1.070E+00	1.461E+01	2.500E+01
32	1.618E+00	8.055E-11	2.840E-08	2.846E+00	5.521E-02	6.712E-02	1.069E+00	1.460E+01	2.500E+01
33	1.543E+00	5.246E-12	0.000E+00	2.853E+00	5.535E-02	6.729E-02	1.067E+00	1.456E+01	2.500E+01
34	1.253E+00	4.194E-13	0.000E+00	2.880E+00	5.587E-02	6.792E-02	1.057E+00	1.443E+01	2.500E+01
34	PRODUCT STREAM							\ 1.443E+01	
35	2.032E+00	8.669E+00	2.537E-01	0.000E+00	0.000E+00	0.000E+00	1.080E+00	1.004E+01	2.500E+01
36	2.114E+00	8.678E+00	2.612E-01	0.000E+00	0.000E+00	0.000E+00	1.083E+00	1.007E+01	2.500E+01
37	2.214E+00	8.184E+00	2.441E-01	0.000E+00	0.000E+00	0.000E+00	1.086E+00	1.010E+01	2.500E+01
38	2.337E+00	7.636E+00	2.240E-01	0.000E+00	0.000E+00	0.000E+00	1.090E+00	1.014E+01	2.500E+01
39	2.480E+00	6.988E+00	2.005E-01	0.000E+00	0.000E+00	1.796E-02	1.098E+00	2.355E+01	2.500E+01
40	2.453E+00	1.030E-01	7.879E-03	0.000E+00	0.000E+00	1.802E-02	1.086E+00	2.347E+01	2.500E+01
41	2.351E+00	1.553E-03	3.207E-04	0.000E+00	0.000E+00	1.808E-02	1.082E+00	2.339E+01	2.500E+01
42	2.182E+00	2.584E-05	1.468E-05	0.000E+00	0.000E+00	1.819E-02	1.076E+00	2.326E+01	2.500E+01
43	1.916E+00	5.152E-07	8.278E-07	0.000E+00	0.000E+00	1.835E-02	1.066E+00	2.306E+01	2.500E+01
44	1.516E+00	1.437E-08	6.699E-08	0.000E+00	0.000E+00	1.859E-02	1.052E+00	2.276E+01	2.500E+01
45	9.612E-01	7.254E-10	9.320E-09	0.000E+00	0.000E+00	1.892E-02	1.033E+00	2.236E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	5.169E-04	8.638E-13	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
2	5.169E-04	3.244E-11	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.590E-07
3	5.169E-04	1.187E-09	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.590E-07
4	5.169E-04	4.339E-08	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	1.214E-06
5	5.169E-04	1.586E-06	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	5.056E-06
6	5.174E-04	5.799E-05	0.000E+00	2.738E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.544E-03
7	5.284E-04	2.117E-03	0.000E+00	2.827E-02	0.000E+00	1.403E-02	8.171E-01	8.001E+01	7.679E-03
8	6.918E-04	7.487E-02	3.589E-16	4.578E-02	1.475E-02	1.803E-02	8.172E-01	8.001E+01	5.409E-03
9	1.381E-03	1.634E+00	2.474E-14	1.678E-01	5.405E-02	3.529E-02	8.193E-01	8.005E+01	2.775E-03
10	2.173E-03	9.714E+00	4.585E-13	4.188E-01	1.350E-01	5.500E-02	8.302E-01	8.028E+01	1.386E-03
11	2.641E-03	2.309E+01	3.401E-12	6.284E-01	2.028E-01	6.409E-02	8.482E-01	8.065E+01	6.180E-04
12	4.503E-03	3.657E+01	1.679E-11	7.665E-01	2.477E-01	6.649E-02	8.667E-01	8.103E+01	4.938E-04
13	3.106E-02	4.748E+01	6.770E-11	9.407E+00	2.336E-04	5.693E-01	8.825E-01	8.142E+01	8.979E-04
14	3.398E-02	5.243E+01	2.900E-07	9.592E+00	2.350E-04	5.542E-01	8.894E-01	8.157E+01	7.245E-03
15	4.080E-02	5.284E+01	1.236E-03	1.039E+01	2.912E-02	5.684E-01	8.902E-01	8.160E+01	3.207E-03
16	5.100E-02	5.261E+01	4.253E-02	1.180E+01	2.060E-01	5.946E-01	8.903E-01	8.163E+01	2.898E-03
17	6.391E-02	5.257E+01	2.075E-01	1.363E+01	5.153E-01	6.220E-01	8.909E-01	8.168E+01	2.887E-03
18	7.981E-02	5.254E+01	4.065E-01	1.586E+01	7.738E-01	6.479E-01	8.917E-01	8.173E+01	2.567E-03
19	9.962E-02	5.227E+01	5.315E-01	1.872E+01	9.277E-01	6.752E-01	8.922E-01	8.180E+01	2.161E-03
20	1.237E-01	5.183E+01	5.803E-01	2.242E+01	1.003E+00	7.029E-01	8.924E-01	8.186E+01	2.890E-03
21	1.521E-01	5.134E+01	5.864E-01	2.714E+01	1.030E+00	7.290E-01	8.926E-01	8.194E+01	3.191E-03
22	1.847E-01	5.087E+01	5.771E-01	3.302E+01	1.035E+00	7.516E-01	8.930E-01	8.203E+01	3.106E-03
23	2.217E-01	5.046E+01	5.653E-01	4.021E+01	1.034E+00	7.695E-01	8.936E-01	8.214E+01	3.821E-03
24	3.657E-01	6.758E+00	2.167E-01	1.529E+01	7.828E-02	2.325E-01	8.371E-01	1.525E+01	3.466E-03
25	3.875E-01	4.427E-01	4.075E-02	1.657E+01	1.488E-02	2.458E-01	8.289E-01	1.523E+01	1.866E-03
26	3.890E-01	2.673E-02	7.064E-03	1.665E+01	2.585E-03	2.467E-01	8.283E-01	1.523E+01	2.513E-03
27	3.891E-01	1.605E-03	1.218E-03	1.666E+01	4.459E-04	2.468E-01	8.282E-01	1.523E+01	3.588E-03
28	3.891E-01	9.636E-05	2.100E-04	1.666E+01	7.687E-05	2.468E-01	8.282E-01	1.523E+01	5.311E-03
29	3.890E-01	5.785E-06	3.617E-05	1.665E+01	1.325E-05	2.468E-01	8.282E-01	1.523E+01	7.476E-03
30	3.887E-01	3.475E-07	6.211E-06	1.664E+01	2.275E-06	2.468E-01	8.282E-01	1.523E+01	7.544E-03
31	3.875E-01	2.089E-08	1.045E-06	1.657E+01	3.829E-07	2.467E-01	8.282E-01	1.523E+01	5.589E-03
32	3.827E-01	1.261E-09	1.541E-07	1.632E+01	5.646E-08	2.467E-01	8.281E-01	1.522E+01	2.936E-03
33	3.639E-01	7.693E-11	0.000E+00	1.532E+01	0.000E+00	2.464E-01	8.275E-01	1.521E+01	8.526E-04
34	2.892E-01	4.639E-12	0.000E+00	1.163E+01	0.000E+00	2.426E-01	8.254E-01	1.517E+01	4.863E-04
35	2.408E-01	5.997E+01	6.312E-01	4.617E+01	1.661E+01	7.909E-01	9.076E-01	6.701E+01	2.247E-05
36	2.467E-01	6.122E+01	6.688E-01	4.699E+01	1.706E+01	7.773E-01	9.097E-01	6.706E+01	8.103E-06
37	2.596E-01	6.120E+01	6.697E-01	4.968E+01	1.823E+01	7.789E-01	9.101E-01	6.709E+01	0.000E+00
38	2.756E-01	6.109E+01	6.668E-01	5.297E+01	1.971E+01	7.808E-01	9.104E-01	6.713E+01	0.000E+00
39	2.952E-01	6.097E+01	6.635E-01	2.489E+01	9.440E+00	3.396E-01	9.109E-01	6.718E+01	0.000E+00
40	5.552E-01	2.476E+00	7.103E-02	6.806E+01	2.553E+01	6.410E-01	8.366E-01	6.647E+01	1.675E-05
41	5.437E-01	3.642E-02	2.786E-03	6.654E+01	2.465E+01	6.563E-01	8.328E-01	6.638E+01	9.190E-06
42	5.055E-01	5.482E-04	1.132E-04	6.045E+01	2.196E+01	6.600E-01	8.316E-01	6.628E+01	0.000E+00
43	4.428E-01	9.090E-06	5.162E-06	5.060E+01	1.788E+01	6.628E-01	8.298E-01	6.612E+01	5.422E-06
44	3.444E-01	1.801E-07	2.866E-07	3.628E+01	1.238E+01	6.573E-01	8.269E-01	6.587E+01	1.447E-05
45	1.988E-01	4.744E-09	2.009E-08	1.916E+01	6.317E+00	6.060E-01	8.228E-01	6.550E+01	9.617E-07

1CALCULATIONS FOR A SOLVENT EXTRACTION PROCESS HAVING INTERACTING SOLUTES

GENERATED PROFILE
THIS IS A MALFUNCTION CASE REPRESENTING A DEPARTURE FROM THE NOMINAL
FLOWRATE THAT WOULD BE SEEN IN CUTTING THE PU STRIP FLOWRATE
DTHETA = 1.000 MINUTES PER TIME INCREMENT
DPRINT = 5001.000 MINUTES WEIWEEN PRINTING OF PROFILES
IFAST = 0 THE RUNGE-KUTTA INTEGRATION WILL BE USED
THIS TIME PERIOD WILL END WHEN TIME = TSTOP = 1000.000 MINUTES OR A TOLERANCE OF TOL = 0.0100 % PER MINUTE IS REACHED
NUMBER OF STAGES = 45
NEWIN = 1 NEW INPUT FLOWS WILL BE GIVEN
NEWOUT = 1 NEW OUTPUT FLOWS WILL BE GIVEN
NEWOUT = 1 INVALID VALUE
IVOLM = 3 MIXER VOLUMES DETERMINED BY PHASE FLOW
IVOLS = 3 SETTLE VOLUMES GIVEN BY PHASE FLOW
IPRO = 0 A NEW INITIAL PROFILE WILL NOT BE READ
IPNCH = 0 NO PUNCHED CARD OUTPUT
NSTR = 1 ROUTING PATTERN OTHER THAN NORMAL
ORGANIC STREAM EXITING AT STAGE 35 FEEDS STAGE 23
TEMPI = 2.500E+01 INITIAL & DEFAULT TEMPERATURE
IRXN = 3 REDUCTION OF PLUTONIUM BY HYDROXYLAMINE

FEED & PRODUCT STREAM DATA	STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	FLOW RATE (L/MIN)	TEMP (C)
AQUEOUS	1	3.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+02	25.0
AQUEOUS	13	3.000E-01	0.000E+00	0.000E+00	0.000E+00	7.000E-02	7.000E-02	1.400E+01	25.0
30.0 % TBP	34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.500E+01	25.0
AQUEOUS	35	2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+01	25.0
AQUEOUS	39	1.250E+00	2.850E+02	3.000E+00	0.000E+00	0.000E+00	3.000E-02	1.410E+01	25.0
30.0 % TBP	45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.500E+01	25.0
AQUEOUS	12	PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS)						5.000E+03	
AQUEOUS	34	PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS)						5.000E+03	

STAGE NO.	MIXER VOLUME BY PHASE		SETTLER VOLUME BY PHASE		MIXER FLOW RATE		INTERSTAGE FLOW RATE	
	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC
1	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
2	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
3	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
4	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
5	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
6	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
7	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
8	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
9	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
10	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
11	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
12	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	0.000E+00	7.931E+01
13	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
14	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
15	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
16	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
17	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
18	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
19	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
20	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
21	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
22	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
23	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
24	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
25	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
26	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
27	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
28	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
29	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
30	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
31	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
32	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
33	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
34	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	0.000E+00	1.487E+01
35	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
36	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
37	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
38	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
39	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01

40	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
41	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
42	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
43	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
44	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
45	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01

TRANSIENT BEHAVIOR RESULTS MIXER CONCENTRATIONS GIVEN

TIME = 0.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
7	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
8	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
9	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
12	PRODUCT STREAM						\	9.991E+01	
13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
25	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
30	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
31	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
32	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
33	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
34	PRODUCT STREAM						\	1.384E+01	
35	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.382E+00	2.500E+01
36	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.382E+00	2.500E+01
37	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.382E+00	2.500E+01
38	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.382E+00	2.500E+01
39	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
40	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
41	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
42	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
43	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
44	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
7	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
8	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
9	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02

19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
25	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
30	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
31	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
32	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
33	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
35	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
36	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
37	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
38	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
39	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
40	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
41	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
42	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
43	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
44	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02

TIME = 526.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	3.000E-02	2.527E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
2	3.000E-02	9.490E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
3	3.000E-02	3.472E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
4	3.000E-02	1.269E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
5	3.000E-02	4.640E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
6	3.001E-02	1.694E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
7	3.014E-02	5.991E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.981E-01	1.000E+02	2.500E+01
8	3.068E-02	1.308E+00	1.946E-14	0.000E+00	0.000E+00	0.000E+00	9.998E-01	1.000E+02	2.500E+01
9	3.126E-02	7.780E+00	3.655E-13	0.000E+00	0.000E+00	0.000E+00	1.009E+00	1.002E+02	2.500E+01
10	3.154E-02	1.852E+01	2.711E-12	0.000E+00	0.000E+00	0.000E+00	1.023E+00	1.006E+02	2.500E+01
11	3.293E-02	2.936E+01	1.340E-11	0.000E+00	0.000E+00	0.000E+00	1.038E+00	1.009E+02	2.500E+01
12	5.420E-02	3.818E+01	5.425E-11	0.000E+00	0.000E+00	0.000E+00	1.051E+00	1.013E+02	2.500E+01
12	PRODUCT STREAM							\ 1.013E+02	
13	3.143E-01	2.908E+01	1.275E-10	1.670E-06	6.934E-02	6.934E-02	1.060E+00	1.413E+01	2.500E+01
14	3.532E-01	3.148E+01	5.345E-07	7.108E-03	6.918E-02	6.921E-02	1.065E+00	1.416E+01	2.500E+01
15	4.132E-01	2.926E+01	2.098E-03	2.422E-01	6.811E-02	6.912E-02	1.065E+00	1.418E+01	2.500E+01
16	4.931E-01	2.563E+01	6.336E-02	1.124E+00	6.432E-02	6.902E-02	1.064E+00	1.420E+01	2.500E+01
17	5.899E-01	2.214E+01	2.663E-01	2.046E+00	6.032E-02	6.888E-02	1.064E+00	1.423E+01	2.500E+01
18	7.057E-01	1.898E+01	4.454E-01	2.564E+00	5.796E-02	6.869E-02	1.065E+00	1.427E+01	2.500E+01
19	8.430E-01	1.596E+01	4.893E-01	2.784E+00	5.680E-02	6.845E-02	1.066E+00	1.432E+01	2.500E+01
20	1.002E+00	1.316E+01	4.409E-01	2.854E+00	5.623E-02	6.817E-02	1.067E+00	1.438E+01	2.500E+01
21	1.183E+00	1.073E+01	3.628E-01	2.866E+00	5.583E-02	6.783E-02	1.070E+00	1.445E+01	2.500E+01
22	1.387E+00	8.696E+00	2.881E-01	2.859E+00	5.547E-02	6.743E-02	1.074E+00	1.453E+01	2.500E+01
23	1.617E+00	7.043E+00	2.263E-01	2.842E+00	5.507E-02	6.696E-02	1.080E+00	1.463E+01	2.500E+01
24	1.641E+00	4.613E-01	4.254E-02	2.846E+00	5.515E-02	6.706E-02	1.071E+00	1.461E+01	2.500E+01
25	1.643E+00	2.785E-02	7.375E-03	2.847E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
26	1.643E+00	1.672E-03	1.272E-03	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
27	1.643E+00	1.004E-04	2.192E-04	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
28	1.643E+00	6.028E-06	3.779E-05	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
29	1.643E+00	3.620E-07	6.512E-06	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
30	1.641E+00	2.177E-08	1.119E-06	2.845E+00	5.517E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
31	1.637E+00	1.314E-09	1.892E-07	2.845E+00	5.518E-02	6.708E-02	1.070E+00	1.461E+01	2.500E+01
32	1.618E+00	8.055E-11	2.840E-08	2.846E+00	5.521E-02	6.712E-02	1.069E+00	1.460E+01	2.500E+01
33	1.543E+00	5.246E-12	0.000E+00	2.853E+00	5.535E-02	6.729E-02	1.067E+00	1.456E+01	2.500E+01
34	1.253E+00	4.194E-13	0.000E+00	2.880E+00	5.587E-02	6.792E-02	1.057E+00	1.443E+01	2.500E+01
34	PRODUCT STREAM							\ 1.443E+01	
35	2.032E+00	8.669E+00	2.537E-01	0.000E+00	0.000E+00	0.000E+00	1.080E+00	1.004E+01	2.500E+01
36	2.114E+00	8.678E+00	2.612E-01	0.000E+00	0.000E+00	0.000E+00	1.083E+00	1.007E+01	2.500E+01
37	2.214E+00	8.184E+00	2.441E-01	0.000E+00	0.000E+00	0.000E+00	1.086E+00	1.010E+01	2.500E+01
38	2.337E+00	7.636E+00	2.240E-01	0.000E+00	0.000E+00	0.000E+00	1.090E+00	1.014E+01	2.500E+01
39	2.480E+00	6.988E+00	2.005E-01	0.000E+00	0.000E+00	1.796E-02	1.098E+00	2.355E+01	2.500E+01
40	2.453E+00	1.030E-01	7.879E-03	0.000E+00	0.000E+00	1.802E-02	1.086E+00	2.347E+01	2.500E+01
41	2.351E+00	1.553E-03	3.207E-04	0.000E+00	0.000E+00	1.808E-02	1.082E+00	2.339E+01	2.500E+01
42	2.182E+00	2.584E-05	1.468E-05	0.000E+00	0.000E+00	1.819E-02	1.076E+00	2.326E+01	2.500E+01
43	1.916E+00	5.152E-07	8.278E-07	0.000E+00	0.000E+00	1.835E-02	1.066E+00	2.306E+01	2.500E+01
44	1.516E+00	1.437E-08	6.699E-08	0.000E+00	0.000E+00	1.859E-02	1.052E+00	2.276E+01	2.500E+01
45	9.612E-01	7.254E-10	9.320E-09	0.000E+00	0.000E+00	1.892E-02	1.033E+00	2.236E+01	2.500E+01

0 ORGANIC PHASE

STAGE	NITRIC ACID	URANIUM	PU (IV)	U EXTRACTION	PU EXTRACT	HNO3 EXTRACT	DENSITY	FLOW RATE	INVENTORY

NO.	(MOL/L)	(G/L)	(G/L)	FACTO	FACTOR	FACTOR	(G/ML)	(L/MIN)	CHANGE (%)
1	5.169E-04	8.638E-13	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
2	5.169E-04	3.244E-11	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.590E-07
3	5.169E-04	1.187E-09	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.590E-07
4	5.169E-04	4.339E-08	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	1.214E-06
5	5.169E-04	1.586E-06	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	5.056E-06
6	5.174E-04	5.799E-05	0.000E+00	2.738E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.544E-03
7	5.284E-04	2.117E-03	0.000E+00	2.827E-02	0.000E+00	1.403E-02	8.171E-01	8.001E+01	7.679E-03
8	6.918E-04	7.487E-02	3.589E-16	4.578E-02	1.475E-02	1.803E-02	8.172E-01	8.001E+01	5.409E-03
9	1.381E-03	1.634E+00	2.474E-14	1.678E-01	5.405E-02	3.529E-02	8.193E-01	8.005E+01	2.775E-03
10	2.173E-03	9.714E+00	4.585E-13	4.188E-01	1.350E-01	5.500E-02	8.302E-01	8.028E+01	1.386E-03
11	2.641E-03	2.309E+01	3.401E-12	6.284E-01	2.028E-01	6.409E-02	8.482E-01	8.065E+01	6.180E-04
12	4.503E-03	3.657E+01	1.679E-11	7.665E-01	2.477E-01	6.649E-02	8.667E-01	8.103E+01	4.938E-04
13	3.106E-02	4.748E+01	6.770E-11	9.407E+00	2.336E-04	5.693E-01	8.825E-01	8.142E+01	8.979E-04
14	3.398E-02	5.243E+01	2.900E-07	9.592E+00	2.350E-04	5.542E-01	8.894E-01	8.157E+01	7.245E-03
15	4.080E-02	5.284E+01	1.236E-03	1.039E+01	2.912E-02	5.684E-01	8.902E-01	8.160E+01	3.207E-03
16	5.100E-02	5.261E+01	4.253E-02	1.180E+01	2.060E-01	5.946E-01	8.903E-01	8.163E+01	2.898E-03
17	6.391E-02	5.257E+01	2.075E-01	1.363E+01	5.153E-01	6.220E-01	8.909E-01	8.168E+01	2.887E-03
18	7.981E-02	5.254E+01	4.065E-01	1.586E+01	7.738E-01	6.479E-01	8.917E-01	8.173E+01	2.567E-03
19	9.962E-02	5.227E+01	5.315E-01	1.872E+01	9.277E-01	6.752E-01	8.922E-01	8.180E+01	2.161E-03
20	1.237E-01	5.183E+01	5.803E-01	2.242E+01	1.003E+00	7.029E-01	8.924E-01	8.186E+01	2.890E-03
21	1.521E-01	5.134E+01	5.864E-01	2.714E+01	1.030E+00	7.290E-01	8.926E-01	8.194E+01	3.191E-03
22	1.847E-01	5.087E+01	5.771E-01	3.302E+01	1.035E+00	7.516E-01	8.930E-01	8.203E+01	3.106E-03
23	2.217E-01	5.046E+01	5.653E-01	4.021E+01	1.034E+00	7.695E-01	8.936E-01	8.214E+01	3.821E-03
24	3.657E-01	6.758E+00	2.167E-01	1.529E+01	7.828E-02	2.325E-01	8.371E-01	1.525E+01	3.466E-03
25	3.875E-01	4.427E-01	4.075E-02	1.657E+01	1.488E-02	2.458E-01	8.289E-01	1.523E+01	1.866E-03
26	3.890E-01	2.673E-02	7.064E-03	1.665E+01	2.585E-03	2.467E-01	8.283E-01	1.523E+01	2.513E-03
27	3.891E-01	1.605E-03	1.218E-03	1.666E+01	4.459E-04	2.468E-01	8.282E-01	1.523E+01	3.588E-03
28	3.891E-01	9.636E-05	2.100E-04	1.666E+01	7.687E-05	2.468E-01	8.282E-01	1.523E+01	5.311E-03
29	3.890E-01	5.785E-06	3.617E-05	1.665E+01	1.325E-05	2.468E-01	8.282E-01	1.523E+01	7.476E-03
30	3.887E-01	3.475E-07	6.211E-06	1.664E+01	2.275E-06	2.468E-01	8.282E-01	1.523E+01	7.544E-03
31	3.875E-01	2.089E-08	1.045E-06	1.657E+01	3.829E-07	2.467E-01	8.282E-01	1.523E+01	5.589E-03
32	3.827E-01	1.261E-09	1.541E-07	1.632E+01	5.646E-08	2.467E-01	8.281E-01	1.522E+01	2.936E-03
33	3.639E-01	7.693E-11	0.000E+00	1.532E+01	0.000E+00	2.464E-01	8.275E-01	1.521E+01	8.526E-04
34	2.892E-01	4.639E-12	0.000E+00	1.163E+01	0.000E+00	2.426E-01	8.254E-01	1.517E+01	4.863E-04
35	2.408E-01	5.997E+01	6.312E-01	4.617E+01	1.661E+01	7.909E-01	9.076E-01	6.701E+01	2.247E-05
36	2.467E-01	6.122E+01	6.688E-01	4.699E+01	1.706E+01	7.773E-01	9.097E-01	6.706E+01	8.103E-06
37	2.596E-01	6.120E+01	6.697E-01	4.968E+01	1.823E+01	7.789E-01	9.101E-01	6.709E+01	0.000E+00
38	2.756E-01	6.109E+01	6.668E-01	5.297E+01	1.971E+01	7.808E-01	9.104E-01	6.713E+01	0.000E+00
39	2.952E-01	6.097E+01	6.635E-01	2.489E+01	9.440E+00	3.396E-01	9.109E-01	6.718E+01	0.000E+00
40	5.552E-01	2.476E+00	7.103E-02	6.806E+01	2.553E+01	6.410E-01	8.366E-01	6.647E+01	1.675E-05
41	5.437E-01	3.642E-02	2.786E-03	6.654E+01	2.465E+01	6.563E-01	8.328E-01	6.638E+01	9.190E-06
42	5.055E-01	5.482E-04	1.132E-04	6.045E+01	2.196E+01	6.600E-01	8.316E-01	6.628E+01	0.000E+00
43	4.428E-01	9.090E-06	5.162E-06	5.060E+01	1.788E+01	6.628E-01	8.298E-01	6.612E+01	5.422E-06
44	3.444E-01	1.801E-07	2.866E-07	3.628E+01	1.238E+01	6.573E-01	8.269E-01	6.587E+01	1.447E-05
45	1.988E-01	4.744E-09	2.009E-08	1.916E+01	6.317E+00	6.060E-01	8.228E-01	6.550E+01	9.617E-07

1CALCULATIONS FOR A SOLVENT EXTRACTION PROCESS HAVING INTERACTING SOLUTES

GENERATED PROFILE
THIS IS A MALFUNCTION CASE REPRESENTING A DEPARTURE FROM THE NOMINAL
FLOWRATE THAT WOULD BE SEEN IN CUTTING THE PU STRIP FLOWRATE
DTHETA = 1.000 MINUTES PER TIME INCREMENT
DPRINT = 5001.000 MINUTES WEIWEEN PRINTING OF PROFILES
IFAST = 0 THE RUNGE-KUTTA INTEGRATION WILL BE USED
THIS TIME PERIOD WILL END WHEN TIME = TSTOP = 1440.000 MINUTES OR A TOLERANCE OF TOL = 0.0100 % PER MINUTE IS REACHED
NUMBER OF STAGES = 45
NEWIN = 1 NEW INPUT FLOWS WILL BE GIVEN
NEWOUT = 1 NEW OUTPUT FLOWS WILL BE GIVEN
NEWOUT = 1 INVALID VALUE
IVOLM = 3 MIXER VOLUMES DETERMINED BY PHASE FLOW
IVOLS = 3 SETTLE VOLUMES GIVEN BY PHASE FLOW
IPRO = 0 A NEW INITIAL PROFILE WILL NOT BE READ
IPNCH = 0 NO PUNCHED CARD OUTPUT
NSTR = 1 ROUTING PATTERN OTHER THAN NORMAL
ORGANIC STREAM EXITING AT STAGE 35 FEEDS STAGE 23
TEMPI = 2.500E+01 INITIAL & DEFAULT TEMPERATURE
IRXN = 3 REDUCTION OF PLUTONIUM BY HYDROXYLAMINE

FEED & PRODUCT STREAM DATA	STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	FLOW RATE (L/MIN)	TEMP (C)
AQUEOUS	1	3.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+02	25.0
AQUEOUS	13	3.000E-01	0.000E+00	0.000E+00	0.000E+00	7.000E-02	7.000E-02	5.000E+00	25.0
30.0 % TBP	34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.500E+01	25.0
AQUEOUS	35	2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+01	25.0
AQUEOUS	39	1.250E+00	2.850E+02	3.000E+00	0.000E+00	0.000E+00	3.000E-02	1.410E+01	25.0
30.0 % TBP	45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.500E+01	25.0
AQUEOUS	12	PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS)						5.000E+03	
AQUEOUS	34	PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS)						5.000E+03	

STAGE NO.	MIXER VOLUME BY PHASE		SETTLER VOLUME BY PHASE		MIXER FLOW RATE		INTERSTAGE FLOW RATE	
	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC
1	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
2	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
3	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
4	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
5	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
6	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
7	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
8	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
9	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
10	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
11	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
12	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	0.000E+00	7.931E+01
13	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01
14	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01
15	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01
16	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01
17	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01
18	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01
19	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01
20	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01
21	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01
22	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01
23	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01	4.943E+00	7.931E+01
24	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01
25	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01
26	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01
27	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01
28	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01
29	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01
30	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01
31	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01
32	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01
33	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01
34	4.943E+00	1.487E+01	4.943E+00	1.487E+01	4.943E+00	1.487E+01	0.000E+00	1.487E+01
35	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
36	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
37	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
38	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
39	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
40	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
41	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
42	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
43	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
44	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
45	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01

TRANSIENT BEHAVIOR RESULTS MIXER CONCENTRATIONS GIVEN

TIME = 0.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	3.000E-02	2.527E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
2	3.000E-02	9.490E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
3	3.000E-02	3.472E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
4	3.000E-02	1.269E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
5	3.000E-02	4.640E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
6	3.001E-02	1.694E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
7	3.014E-02	5.991E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.981E-01	1.000E+02	2.500E+01
8	3.068E-02	1.308E+00	1.946E-14	0.000E+00	0.000E+00	0.000E+00	9.998E-01	1.000E+02	2.500E+01
9	3.126E-02	7.780E+00	3.655E-13	0.000E+00	0.000E+00	0.000E+00	1.009E+00	1.002E+02	2.500E+01
10	3.154E-02	1.852E+01	2.711E-12	0.000E+00	0.000E+00	0.000E+00	1.023E+00	1.006E+02	2.500E+01
11	3.293E-02	2.936E+01	1.340E-11	0.000E+00	0.000E+00	0.000E+00	1.038E+00	1.009E+02	2.500E+01
12	5.420E-02	3.818E+01	5.425E-11	0.000E+00	0.000E+00	0.000E+00	1.051E+00	1.013E+02	2.500E+01
12	PRODUCT STREAM							\ 1.013E+02	
13	3.143E-01	2.908E+01	1.275E-10	1.670E-06	6.934E-02	6.934E-02	1.060E+00	5.047E+00	2.500E+01
14	3.532E-01	3.148E+01	5.345E-07	7.108E-03	6.918E-02	6.921E-02	1.065E+00	5.057E+00	2.500E+01
15	4.132E-01	2.926E+01	2.098E-03	2.422E-01	6.811E-02	6.912E-02	1.065E+00	5.063E+00	2.500E+01
16	4.931E-01	2.563E+01	6.336E-02	1.124E+00	6.432E-02	6.902E-02	1.064E+00	5.071E+00	2.500E+01
17	5.899E-01	2.214E+01	2.663E-01	2.046E+00	6.032E-02	6.888E-02	1.064E+00	5.081E+00	2.500E+01
18	7.057E-01	1.898E+01	4.454E-01	2.564E+00	5.796E-02	6.869E-02	1.065E+00	5.095E+00	2.500E+01
19	8.430E-01	1.596E+01	4.893E-01	2.784E+00	5.680E-02	6.845E-02	1.066E+00	5.113E+00	2.500E+01
20	1.002E+00	1.316E+01	4.409E-01	2.854E+00	5.623E-02	6.817E-02	1.067E+00	5.134E+00	2.500E+01
21	1.183E+00	1.073E+01	3.628E-01	2.866E+00	5.583E-02	6.783E-02	1.070E+00	5.160E+00	2.500E+01
22	1.387E+00	8.696E+00	2.881E-01	2.859E+00	5.547E-02	6.743E-02	1.074E+00	5.191E+00	2.500E+01
23	1.617E+00	7.043E+00	2.263E-01	2.842E+00	5.507E-02	6.696E-02	1.080E+00	5.227E+00	2.500E+01
24	1.641E+00	4.613E-01	4.254E-02	2.846E+00	5.515E-02	6.706E-02	1.071E+00	5.219E+00	2.500E+01
25	1.643E+00	2.785E-02	7.375E-03	2.847E+00	5.516E-02	6.707E-02	1.070E+00	5.219E+00	2.500E+01

26	1.643E+00	1.672E-03	1.272E-03	2.846E+00	5.516E-02	6.707E-02	1.070E+00	5.219E+00	2.500E+01
27	1.643E+00	1.004E-04	2.192E-04	2.846E+00	5.516E-02	6.707E-02	1.070E+00	5.219E+00	2.500E+01
28	1.643E+00	6.028E-06	3.779E-05	2.846E+00	5.516E-02	6.707E-02	1.070E+00	5.219E+00	2.500E+01
29	1.643E+00	3.620E-07	6.512E-06	2.846E+00	5.516E-02	6.707E-02	1.070E+00	5.219E+00	2.500E+01
30	1.641E+00	2.177E-08	1.119E-06	2.845E+00	5.517E-02	6.707E-02	1.070E+00	5.218E+00	2.500E+01
31	1.637E+00	1.314E-09	1.892E-07	2.845E+00	5.518E-02	6.708E-02	1.070E+00	5.218E+00	2.500E+01
32	1.618E+00	8.055E-11	2.840E-08	2.846E+00	5.521E-02	6.712E-02	1.069E+00	5.214E+00	2.500E+01
33	1.543E+00	5.246E-12	0.000E+00	2.853E+00	5.535E-02	6.729E-02	1.067E+00	5.202E+00	2.500E+01
34	1.253E+00	4.194E-13	0.000E+00	2.880E+00	5.587E-02	6.792E-02	1.057E+00	5.153E+00	2.500E+01
34	PRODUCT STREAM							\ 5.153E+00	\
35	2.032E+00	8.669E+00	2.537E-01	0.000E+00	0.000E+00	0.000E+00	1.080E+00	1.004E+01	2.500E+01
36	2.114E+00	8.678E+00	2.612E-01	0.000E+00	0.000E+00	0.000E+00	1.083E+00	1.007E+01	2.500E+01
37	2.214E+00	8.184E+00	2.441E-01	0.000E+00	0.000E+00	0.000E+00	1.086E+00	1.010E+01	2.500E+01
38	2.337E+00	7.636E+00	2.240E-01	0.000E+00	0.000E+00	0.000E+00	1.090E+00	1.014E+01	2.500E+01
39	2.480E+00	6.988E+00	2.005E-01	0.000E+00	0.000E+00	1.796E-02	1.098E+00	2.355E+01	2.500E+01
40	2.453E+00	1.030E-01	7.879E-03	0.000E+00	0.000E+00	1.802E-02	1.086E+00	2.347E+01	2.500E+01
41	2.351E+00	1.553E-03	3.207E-04	0.000E+00	0.000E+00	1.808E-02	1.082E+00	2.339E+01	2.500E+01
42	2.182E+00	2.584E-05	1.468E-05	0.000E+00	0.000E+00	1.819E-02	1.076E+00	2.326E+01	2.500E+01
43	1.916E+00	5.152E-07	8.278E-07	0.000E+00	0.000E+00	1.835E-02	1.066E+00	2.306E+01	2.500E+01
44	1.516E+00	1.437E-08	6.699E-08	0.000E+00	0.000E+00	1.859E-02	1.052E+00	2.276E+01	2.500E+01
45	9.612E-01	7.254E-10	9.320E-09	0.000E+00	0.000E+00	1.892E-02	1.033E+00	2.236E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	5.169E-04	8.638E-13	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
2	5.169E-04	3.244E-11	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.590E-07
3	5.169E-04	1.187E-09	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.590E-07
4	5.169E-04	4.339E-08	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	1.214E-06
5	5.169E-04	1.586E-06	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	5.056E-06
6	5.174E-04	5.799E-05	0.000E+00	2.738E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.544E-03
7	5.284E-04	2.117E-03	0.000E+00	2.827E-02	0.000E+00	1.403E-02	8.171E-01	8.001E+01	7.679E-03
8	6.918E-04	7.487E-02	3.589E-16	4.578E-02	1.475E-02	1.803E-02	8.172E-01	8.001E+01	5.409E-03
9	1.381E-03	1.634E+00	2.474E-14	1.678E-01	5.405E-02	3.529E-02	8.193E-01	8.005E+01	2.775E-03
10	2.173E-03	9.714E+00	4.585E-13	4.188E-01	1.350E-01	5.500E-02	8.302E-01	8.028E+01	1.386E-03
11	2.641E-03	2.309E+01	3.401E-12	6.284E-01	2.028E-01	6.409E-02	8.482E-01	8.065E+01	6.180E-04
12	4.503E-03	3.657E+01	1.679E-11	7.665E-01	2.477E-01	6.649E-02	8.667E-01	8.103E+01	4.938E-04
13	3.106E-02	4.748E+01	6.770E-11	2.634E+01	6.541E-04	1.594E+00	8.825E-01	8.142E+01	8.979E-04
14	3.398E-02	5.243E+01	2.900E-07	2.686E+01	6.579E-04	1.552E+00	8.894E-01	8.157E+01	7.245E-03
15	4.080E-02	5.284E+01	1.236E-03	2.910E+01	8.153E-02	1.592E+00	8.902E-01	8.160E+01	3.207E-03
16	5.100E-02	5.261E+01	4.253E-02	3.304E+01	5.767E-01	1.665E+00	8.903E-01	8.163E+01	2.898E-03
17	6.391E-02	5.257E+01	2.075E-01	3.817E+01	1.443E+00	1.741E+00	8.909E-01	8.168E+01	2.887E-03
18	7.981E-02	5.254E+01	4.065E-01	4.441E+01	2.167E+00	1.814E+00	8.917E-01	8.173E+01	2.567E-03
19	9.962E-02	5.227E+01	5.315E-01	5.240E+01	2.598E+00	1.890E+00	8.922E-01	8.180E+01	2.161E-03
20	1.237E-01	5.183E+01	5.803E-01	6.277E+01	2.808E+00	1.968E+00	8.924E-01	8.186E+01	2.890E-03
21	1.521E-01	5.134E+01	5.864E-01	7.599E+01	2.884E+00	2.041E+00	8.926E-01	8.194E+01	3.191E-03
22	1.847E-01	5.087E+01	5.771E-01	9.246E+01	2.898E+00	2.104E+00	8.930E-01	8.203E+01	3.106E-03
23	2.217E-01	5.046E+01	5.653E-01	1.126E+02	2.895E+00	2.155E+00	8.936E-01	8.214E+01	3.821E-03
24	3.657E-01	6.758E+00	2.167E-01	4.281E+01	2.192E-01	6.511E-01	8.371E-01	1.525E+01	3.466E-03
25	3.875E-01	4.427E-01	4.075E-02	4.638E+01	4.166E-02	6.882E-01	8.289E-01	1.523E+01	1.866E-03
26	3.890E-01	2.673E-02	7.064E-03	4.663E+01	7.238E-03	6.908E-01	8.283E-01	1.523E+01	2.513E-03
27	3.891E-01	1.605E-03	1.218E-03	4.665E+01	1.249E-03	6.909E-01	8.282E-01	1.523E+01	3.588E-03
28	3.891E-01	9.636E-05	2.100E-04	4.664E+01	2.152E-04	6.909E-01	8.282E-01	1.523E+01	5.311E-03
29	3.890E-01	5.785E-06	3.617E-05	4.663E+01	3.709E-05	6.909E-01	8.282E-01	1.523E+01	7.476E-03
30	3.887E-01	3.475E-07	6.211E-06	4.658E+01	6.370E-06	6.909E-01	8.282E-01	1.523E+01	7.544E-03
31	3.875E-01	2.089E-08	1.045E-06	4.640E+01	1.072E-06	6.909E-01	8.282E-01	1.523E+01	5.589E-03
32	3.827E-01	1.261E-09	1.541E-07	4.569E+01	1.581E-07	6.907E-01	8.281E-01	1.522E+01	2.936E-03
33	3.639E-01	7.693E-11	0.000E+00	4.289E+01	0.000E+00	6.898E-01	8.275E-01	1.521E+01	8.526E-04
34	2.892E-01	4.639E-12	0.000E+00	3.256E+01	0.000E+00	6.793E-01	8.254E-01	1.517E+01	4.863E-04
35	2.408E-01	5.997E+01	6.312E-01	4.617E+01	1.661E+01	7.909E-01	9.076E-01	6.701E+01	2.247E-05
36	2.467E-01	6.122E+01	6.688E-01	4.699E+01	1.706E+01	7.773E-01	9.097E-01	6.706E+01	8.103E-06
37	2.596E-01	6.120E+01	6.697E-01	4.968E+01	1.823E+01	7.789E-01	9.101E-01	6.709E+01	0.000E+00
38	2.756E-01	6.109E+01	6.668E-01	5.297E+01	1.971E+01	7.808E-01	9.104E-01	6.713E+01	0.000E+00
39	2.952E-01	6.097E+01	6.635E-01	2.489E+01	9.440E+00	3.396E-01	9.109E-01	6.718E+01	0.000E+00
40	5.552E-01	2.476E+00	7.103E-02	6.806E+01	2.553E+01	6.410E-01	8.366E-01	6.647E+01	1.675E-05
41	5.437E-01	3.642E-02	2.786E-03	6.654E+01	2.465E+01	6.563E-01	8.328E-01	6.638E+01	9.190E-06
42	5.055E-01	5.482E-04	1.132E-04	6.045E+01	2.196E+01	6.600E-01	8.316E-01	6.628E+01	0.000E+00
43	4.428E-01	9.090E-06	5.162E-06	5.060E+01	1.788E+01	6.628E-01	8.298E-01	6.612E+01	5.422E-06
44	3.444E-01	1.801E-07	2.866E-07	3.628E+01	1.238E+01	6.573E-01	8.269E-01	6.587E+01	1.447E-05
45	1.988E-01	4.744E-09	2.009E-08	1.916E+01	6.317E+00	6.060E-01	8.228E-01	6.550E+01	9.617E-07

TIME = 1440.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	3.000E-02	5.175E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
2	3.000E-02	1.944E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
3	3.000E-02	7.113E-07	2.477E-13	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
4	3.000E-02	2.601E-05	2.836E-11	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
5	3.001E-02	9.502E-04	3.217E-09	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
6	3.010E-02	3.406E-02	3.580E-07	0.000E+00	0.000E+00	0.000E+00	9.981E-01	1.000E+02	2.500E+01

7	3.057E-02	8.651E-01	2.823E-05	0.000E+00	0.000E+00	0.000E+00	9.992E-01	1.000E+02	2.500E+01
8	3.119E-02	6.324E+00	6.405E-04	0.000E+00	0.000E+00	0.000E+00	1.007E+00	1.002E+02	2.500E+01
9	3.147E-02	1.671E+01	5.250E-03	0.000E+00	0.000E+00	0.000E+00	1.021E+00	1.005E+02	2.500E+01
10	3.205E-02	2.771E+01	2.698E-02	0.000E+00	0.000E+00	0.000E+00	1.036E+00	1.009E+02	2.500E+01
11	4.102E-02	3.740E+01	1.128E-01	0.000E+00	0.000E+00	0.000E+00	1.050E+00	1.012E+02	2.500E+01
12	1.689E-01	3.918E+01	3.648E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	1.017E+02	2.500E+01
12	PRODUCT STREAM							\ 1.017E+02	
13	1.294E+00	9.072E+00	2.490E-01	7.501E-01	6.449E-02	6.762E-02	1.068E+00	5.176E+00	2.500E+01
14	1.705E+00	6.551E+00	1.958E-01	8.088E-01	6.340E-02	6.678E-02	1.079E+00	5.241E+00	2.500E+01
15	1.874E+00	5.746E+00	1.698E-01	8.332E-01	6.295E-02	6.643E-02	1.084E+00	5.268E+00	2.500E+01
16	1.945E+00	5.460E+00	1.604E-01	8.424E-01	6.276E-02	6.628E-02	1.086E+00	5.280E+00	2.500E+01
17	1.976E+00	5.347E+00	1.569E-01	8.615E-01	6.262E-02	6.622E-02	1.087E+00	5.285E+00	2.500E+01
18	1.989E+00	5.300E+00	1.557E-01	8.728E-01	6.254E-02	6.619E-02	1.088E+00	5.288E+00	2.500E+01
19	1.995E+00	5.279E+00	1.553E-01	8.868E-01	6.247E-02	6.618E-02	1.088E+00	5.289E+00	2.500E+01
20	1.997E+00	5.271E+00	1.552E-01	8.921E-01	6.244E-02	6.618E-02	1.088E+00	5.289E+00	2.500E+01
21	1.998E+00	5.267E+00	1.552E-01	9.083E-01	6.237E-02	6.617E-02	1.088E+00	5.289E+00	2.500E+01
22	1.999E+00	5.266E+00	1.554E-01	9.133E-01	6.235E-02	6.617E-02	1.088E+00	5.289E+00	2.500E+01
23	1.999E+00	5.263E+00	1.553E-01	9.369E-01	6.225E-02	6.617E-02	1.088E+00	5.289E+00	2.500E+01
24	2.012E+00	9.165E-02	7.525E-03	9.291E-01	6.237E-02	6.626E-02	1.081E+00	5.282E+00	2.500E+01
25	1.999E+00	1.574E-03	3.597E-04	9.279E-01	6.241E-02	6.629E-02	1.080E+00	5.280E+00	2.500E+01
26	1.977E+00	2.739E-05	1.747E-05	9.299E-01	6.245E-02	6.634E-02	1.079E+00	5.276E+00	2.500E+01
27	1.945E+00	4.875E-07	8.680E-07	9.333E-01	6.250E-02	6.641E-02	1.078E+00	5.270E+00	2.500E+01
28	1.895E+00	8.981E-09	4.277E-08	9.364E-01	6.260E-02	6.652E-02	1.076E+00	5.262E+00	2.500E+01
29	1.822E+00	1.746E-10	0.000E+00	9.383E-01	6.275E-02	6.668E-02	1.074E+00	5.249E+00	2.500E+01
30	1.715E+00	3.688E-12	0.000E+00	9.410E-01	6.297E-02	6.691E-02	1.070E+00	5.231E+00	2.500E+01
31	1.560E+00	8.869E-14	0.000E+00	9.450E-01	6.329E-02	6.725E-02	1.064E+00	5.205E+00	2.500E+01
32	1.344E+00	2.545E-15	0.000E+00	9.505E-01	6.374E-02	6.772E-02	1.057E+00	5.168E+00	2.500E+01
33	1.055E+00	0.000E+00	0.000E+00	9.583E-01	6.434E-02	6.835E-02	1.047E+00	5.121E+00	2.500E+01
34	6.777E-01	0.000E+00	0.000E+00	9.700E-01	6.512E-02	6.918E-02	1.034E+00	5.060E+00	2.500E+01
34	PRODUCT STREAM							\ 5.060E+00	
35	2.032E+00	8.669E+00	2.537E-01	0.000E+00	0.000E+00	0.000E+00	1.080E+00	1.004E+01	2.500E+01
36	2.114E+00	8.678E+00	2.612E-01	0.000E+00	0.000E+00	0.000E+00	1.083E+00	1.007E+01	2.500E+01
37	2.214E+00	8.184E+00	2.441E-01	0.000E+00	0.000E+00	0.000E+00	1.086E+00	1.010E+01	2.500E+01
38	2.337E+00	7.636E+00	2.240E-01	0.000E+00	0.000E+00	0.000E+00	1.090E+00	1.014E+01	2.500E+01
39	2.480E+00	6.988E+00	2.005E-01	0.000E+00	0.000E+00	1.796E-02	1.098E+00	2.355E+01	2.500E+01
40	2.453E+00	1.030E-01	7.879E-03	0.000E+00	0.000E+00	1.802E-02	1.086E+00	2.347E+01	2.500E+01
41	2.351E+00	1.553E-03	3.207E-04	0.000E+00	0.000E+00	1.808E-02	1.082E+00	2.339E+01	2.500E+01
42	2.182E+00	2.584E-05	1.468E-05	0.000E+00	0.000E+00	1.819E-02	1.076E+00	2.326E+01	2.500E+01
43	1.916E+00	5.152E-07	8.278E-07	0.000E+00	0.000E+00	1.835E-02	1.066E+00	2.306E+01	2.500E+01
44	1.516E+00	1.437E-08	6.699E-08	0.000E+00	0.000E+00	1.859E-02	1.052E+00	2.276E+01	2.500E+01
45	9.612E-01	7.254E-10	9.320E-09	0.000E+00	0.000E+00	1.892E-02	1.033E+00	2.236E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	5.169E-04	1.769E-11	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
2	5.169E-04	6.645E-10	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.590E-07
3	5.169E-04	2.431E-08	2.727E-15	2.735E-02	8.810E-03	1.379E-02	8.171E-01	8.001E+01	1.063E-06
4	5.169E-04	8.890E-07	3.123E-13	2.735E-02	8.810E-03	1.379E-02	8.171E-01	8.001E+01	9.108E-07
5	5.172E-04	3.251E-05	3.545E-11	2.737E-02	8.817E-03	1.379E-02	8.171E-01	8.001E+01	6.838E-05
6	5.240E-04	1.188E-03	4.021E-09	2.790E-02	8.986E-03	1.393E-02	8.171E-01	8.001E+01	6.175E-05
7	6.371E-04	4.257E-02	4.475E-07	3.936E-02	1.268E-02	1.667E-02	8.172E-01	8.001E+01	2.290E-04
8	1.240E-03	1.081E+00	3.528E-05	1.366E-01	4.400E-02	3.177E-02	8.186E-01	8.004E+01	2.809E-03
9	2.069E-03	7.898E+00	7.999E-04	3.773E-01	1.216E-01	5.249E-02	8.277E-01	8.023E+01	3.179E-03
10	2.538E-03	2.084E+01	6.550E-03	6.011E-01	1.939E-01	6.327E-02	8.452E-01	8.059E+01	8.824E-03
11	3.381E-03	3.451E+01	3.362E-02	7.384E-01	2.386E-01	6.596E-02	8.639E-01	8.097E+01	1.023E-02
12	1.465E-02	4.652E+01	1.403E-01	9.499E-01	3.078E-01	6.941E-02	8.809E-01	8.135E+01	1.541E-02
13	1.735E-01	4.863E+01	4.528E-01	8.484E+01	7.174E+00	2.122E+00	8.893E-01	8.192E+01	5.547E-03
14	2.362E-01	4.942E+01	5.176E-01	1.182E+02	8.076E+00	2.172E+00	8.925E-01	8.215E+01	3.077E-02
15	2.632E-01	4.924E+01	5.178E-01	1.338E+02	8.058E+00	2.192E+00	8.931E-01	8.223E+01	1.005E+00
16	2.745E-01	4.918E+01	5.178E-01	1.403E+02	8.045E+00	2.198E+00	8.934E-01	8.227E+01	2.953E-03
17	2.793E-01	4.916E+01	5.186E-01	1.431E+02	7.928E+00	2.201E+00	8.935E-01	8.228E+01	5.144E-02
18	2.813E-01	4.915E+01	5.201E-01	1.443E+02	7.869E+00	2.201E+00	8.936E-01	8.229E+01	7.587E-01
19	2.822E-01	4.916E+01	5.208E-01	1.449E+02	7.777E+00	2.202E+00	8.936E-01	8.229E+01	6.469E-01
20	2.826E-01	4.916E+01	5.217E-01	1.451E+02	7.750E+00	2.202E+00	8.936E-01	8.229E+01	4.082E-02
21	2.828E-01	4.916E+01	5.220E-01	1.452E+02	7.637E+00	2.202E+00	8.937E-01	8.230E+01	8.680E-01
22	2.829E-01	4.916E+01	5.229E-01	1.453E+02	7.613E+00	2.202E+00	8.937E-01	8.230E+01	3.719E-01
23	2.829E-01	4.916E+01	5.228E-01	1.453E+02	7.448E+00	2.202E+00	8.937E-01	8.230E+01	2.677E-01
24	4.674E-01	1.822E+00	5.373E-02	5.752E+01	1.660E-01	6.721E-01	8.331E-01	1.528E+01	1.205E-01
25	4.713E-01	3.169E-02	2.598E-03	5.827E+01	8.099E-03	6.823E-01	8.307E-01	1.528E+01	3.434E-02
26	4.663E-01	5.439E-04	1.241E-04	5.748E+01	3.864E-04	6.828E-01	8.305E-01	1.527E+01	7.595E-02
27	4.586E-01	9.464E-06	6.010E-06	5.624E+01	1.866E-05	6.832E-01	8.303E-01	1.527E+01	8.944E-02
28	4.468E-01	1.683E-07	2.845E-07	5.437E+01	8.812E-07	6.837E-01	8.299E-01	1.526E+01	5.392E-03
29	4.291E-01	3.099E-09	0.000E+00	5.158E+01	0.000E+00	6.842E-01	8.294E-01	1.525E+01	2.271E-02
30	4.028E-01	6.015E-11	0.000E+00	4.751E+01	0.000E+00	6.842E-01	8.286E-01	1.524E+01	1.977E-02
31	3.642E-01	1.267E-12	0.000E+00	4.176E+01	0.000E+00	6.824E-01	8.275E-01	1.521E+01	3.838E-02
32	3.090E-01	2.955E-14	0.000E+00	3.410E+01	0.000E+00	6.752E-01	8.259E-01	1.518E+01	4.511E-02
33	2.325E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.515E-01	8.237E-01	1.514E+01	8.441E-03
34	1.308E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.752E-01	8.208E-01	1.508E+01	3.323E-02
35	2.408E-01	5.997E+01	6.312E-01	4.617E+01	1.661E+01	7.909E-01	9.076E-01	6.701E+01	2.247E-05
36	2.467E-01	6.122E+01	6.688E-01	4.699E+01	1.706E+01	7.773E-01	9.097E-01	6.706E+01	8.103E-06

37	2.596E-01	6.120E+01	6.697E-01	4.968E+01	1.823E+01	7.789E-01	9.101E-01	6.709E+01	0.000E+00
38	2.756E-01	6.109E+01	6.668E-01	5.297E+01	1.971E+01	7.808E-01	9.104E-01	6.713E+01	0.000E+00
39	2.952E-01	6.097E+01	6.635E-01	2.489E+01	9.440E+00	3.396E-01	9.109E-01	6.718E+01	0.000E+00
40	5.552E-01	2.476E+00	7.103E-02	6.806E+01	2.553E+01	6.410E-01	8.366E-01	6.647E+01	1.675E-05
41	5.437E-01	3.642E-02	2.786E-03	6.654E+01	2.465E+01	6.563E-01	8.328E-01	6.638E+01	9.190E-06
42	5.055E-01	5.482E-04	1.132E-04	6.045E+01	2.196E+01	6.600E-01	8.316E-01	6.628E+01	0.000E+00
43	4.428E-01	9.090E-06	5.162E-06	5.060E+01	1.788E+01	6.628E-01	8.298E-01	6.612E+01	5.422E-06
44	3.444E-01	1.801E-07	2.866E-07	3.628E+01	1.238E+01	6.573E-01	8.269E-01	6.587E+01	1.447E-05
45	1.988E-01	4.744E-09	2.009E-08	1.916E+01	6.317E+00	6.060E-01	8.228E-01	6.550E+01	9.617E-07

1CALCULATIONS FOR A SOLVENT EXTRACTION PROCESS HAVING INTERACTING SOLUTES

GENERATED PROFILE
THIS IS A MALFUNCTION CASE REPRESENTING A DEPARTURE FROM THE NOMINAL
FLOWRATE THAT WOULD BE SEEN IN CUTTING THE PU STRIP FLOWRATE
DTHETA = 1.000 MINUTES PER TIME INCREMENT
DPRINT = 5001.000 MINUTES WETWEEN PRINTING OF PROFILES
IFAST = 0 THE RUNGE-KUTTA INTEGRATION WILL BE USED
THIS TIME PERIOD WILL END WHEN TIME = TSTOP = 5000.000 MINUTES OR A TOLERANCE OF TOL = 0.0100 % PER MINUTE IS REACHED
NUMBER OF STAGES = 45
NEWIN = 1 NEW INPUT FLOWS WILL BE GIVEN
NEWOUT = 1 NEW OUTPUT FLOWS WILL BE GIVEN
NEWOUT = 1 INVALID VALUE
IVOLM = 3 MIXER VOLUMES DETERMINED BY PHASE FLOW
IVOLS = 3 SETTLE VOLUMES GIVEN BY PHASE FLOW
IPRO = 0 A NEW INITIAL PROFILE WILL NOT BE READ
IPNCH = 0 NO PUNCHED CARD OUTPUT
NSTR = 1 ROUTING PATTERN OTHER THAN NORMAL
ORGANIC STREAM EXITING AT STAGE 35 FEEDS STAGE 23
TEMPI = 2.500E+01 INITIAL & DEFAULT TEMPERATURE
IRXN = 3 REDUCTION OF PLUTONIUM BY HYDROXYLAMINE

FEED & PRODUCT STREAM DATA	STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	FLOW RATE (L/MIN)	TEMP (C)
AQUEOUS	1	3.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+02	25.0
AQUEOUS	13	3.000E-01	0.000E+00	0.000E+00	0.000E+00	7.000E-02	7.000E-02	1.400E+01	25.0
30.0 % TBP	34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.500E+01	25.0
AQUEOUS	35	2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+01	25.0
AQUEOUS	39	1.250E+00	2.850E+02	3.000E+00	0.000E+00	0.000E+00	3.000E-02	1.410E+01	25.0
30.0 % TBP	45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.500E+01	25.0
AQUEOUS	12	PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS)						5.000E+03	
AQUEOUS	34	PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS)						5.000E+03	

STAGE NO.	MIXER VOLUME BY PHASE AQUEOUS	MIXER VOLUME BY PHASE ORGANIC	SETTLER VOLUME BY PHASE AQUEOUS	SETTLER VOLUME BY PHASE ORGANIC	MIXER FLOW RATE AQUEOUS	MIXER FLOW RATE ORGANIC	INTERSTAGE FLOW RATE AQUEOUS	INTERSTAGE FLOW RATE ORGANIC
1	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
2	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
3	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
4	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
5	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
6	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
7	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
8	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
9	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
10	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
11	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
12	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	0.000E+00	7.931E+01
13	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
14	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
15	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
16	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
17	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
18	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
19	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
20	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
21	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
22	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
23	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
24	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
25	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
26	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
27	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
28	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
29	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
30	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
31	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
32	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
33	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
34	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	0.000E+00	1.487E+01

35	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
36	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
37	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
38	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
39	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
40	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
41	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
42	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
43	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
44	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
45	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01

TRANSIENT BEHAVIOR RESULTS MIXER CONCENTRATIONS GIVEN

TIME = 0.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	3.000E-02	5.175E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
2	3.000E-02	1.944E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
3	3.000E-02	7.113E-07	2.477E-13	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
4	3.000E-02	2.601E-05	2.836E-11	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
5	3.001E-02	9.502E-04	3.217E-09	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
6	3.010E-02	3.406E-02	3.580E-07	0.000E+00	0.000E+00	0.000E+00	9.981E-01	1.000E+02	2.500E+01
7	3.057E-02	8.651E-01	2.823E-05	0.000E+00	0.000E+00	0.000E+00	9.992E-01	1.000E+02	2.500E+01
8	3.119E-02	6.324E+00	6.405E-04	0.000E+00	0.000E+00	0.000E+00	1.007E+00	1.002E+02	2.500E+01
9	3.147E-02	1.671E+01	5.250E-03	0.000E+00	0.000E+00	0.000E+00	1.021E+00	1.005E+02	2.500E+01
10	3.205E-02	2.771E+01	2.698E-02	0.000E+00	0.000E+00	0.000E+00	1.036E+00	1.009E+02	2.500E+01
11	4.102E-02	3.740E+01	1.128E-01	0.000E+00	0.000E+00	0.000E+00	1.050E+00	1.012E+02	2.500E+01
12	1.689E-01	3.918E+01	3.648E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	1.017E+02	2.500E+01
12	PRODUCT STREAM						\	1.017E+02	
13	1.294E+00	9.072E+00	2.490E-01	7.501E-01	6.449E-02	6.762E-02	1.068E+00	1.449E+01	2.500E+01
14	1.705E+00	6.551E+00	1.958E-01	8.088E-01	6.340E-02	6.678E-02	1.079E+00	1.467E+01	2.500E+01
15	1.874E+00	5.746E+00	1.698E-01	8.332E-01	6.295E-02	6.643E-02	1.084E+00	1.475E+01	2.500E+01
16	1.945E+00	5.460E+00	1.604E-01	8.424E-01	6.276E-02	6.628E-02	1.086E+00	1.478E+01	2.500E+01
17	1.976E+00	5.347E+00	1.569E-01	8.615E-01	6.262E-02	6.622E-02	1.087E+00	1.480E+01	2.500E+01
18	1.989E+00	5.300E+00	1.557E-01	8.728E-01	6.254E-02	6.619E-02	1.088E+00	1.481E+01	2.500E+01
19	1.995E+00	5.279E+00	1.553E-01	8.868E-01	6.247E-02	6.618E-02	1.088E+00	1.481E+01	2.500E+01
20	1.997E+00	5.271E+00	1.552E-01	8.921E-01	6.244E-02	6.618E-02	1.088E+00	1.481E+01	2.500E+01
21	1.998E+00	5.267E+00	1.552E-01	9.083E-01	6.237E-02	6.617E-02	1.088E+00	1.481E+01	2.500E+01
22	1.999E+00	5.266E+00	1.554E-01	9.133E-01	6.235E-02	6.617E-02	1.088E+00	1.481E+01	2.500E+01
23	1.999E+00	5.263E+00	1.553E-01	9.369E-01	6.225E-02	6.617E-02	1.088E+00	1.481E+01	2.500E+01
24	2.012E+00	9.165E-02	7.525E-03	9.291E-01	6.237E-02	6.626E-02	1.081E+00	1.479E+01	2.500E+01
25	1.999E+00	1.574E-03	3.597E-04	9.279E-01	6.241E-02	6.629E-02	1.080E+00	1.478E+01	2.500E+01
26	1.977E+00	2.739E-05	1.747E-05	9.299E-01	6.245E-02	6.634E-02	1.079E+00	1.477E+01	2.500E+01
27	1.945E+00	4.875E-07	8.680E-07	9.333E-01	6.250E-02	6.641E-02	1.078E+00	1.476E+01	2.500E+01
28	1.895E+00	8.981E-09	4.277E-08	9.364E-01	6.260E-02	6.652E-02	1.076E+00	1.473E+01	2.500E+01
29	1.822E+00	1.746E-10	0.000E+00	9.383E-01	6.275E-02	6.668E-02	1.074E+00	1.470E+01	2.500E+01
30	1.715E+00	3.688E-12	0.000E+00	9.410E-01	6.297E-02	6.691E-02	1.070E+00	1.465E+01	2.500E+01
31	1.560E+00	8.869E-14	0.000E+00	9.450E-01	6.329E-02	6.725E-02	1.064E+00	1.457E+01	2.500E+01
32	1.344E+00	2.545E-15	0.000E+00	9.505E-01	6.374E-02	6.772E-02	1.057E+00	1.447E+01	2.500E+01
33	1.055E+00	0.000E+00	0.000E+00	9.583E-01	6.434E-02	6.835E-02	1.047E+00	1.434E+01	2.500E+01
34	6.777E-01	0.000E+00	0.000E+00	9.700E-01	6.512E-02	6.918E-02	1.034E+00	1.417E+01	2.500E+01
34	PRODUCT STREAM						\	1.417E+01	
35	2.032E+00	8.669E+00	2.537E-01	0.000E+00	0.000E+00	0.000E+00	1.080E+00	1.004E+01	2.500E+01
36	2.114E+00	8.678E+00	2.612E-01	0.000E+00	0.000E+00	0.000E+00	1.083E+00	1.007E+01	2.500E+01
37	2.214E+00	8.184E+00	2.441E-01	0.000E+00	0.000E+00	0.000E+00	1.086E+00	1.010E+01	2.500E+01
38	2.337E+00	7.636E+00	2.240E-01	0.000E+00	0.000E+00	0.000E+00	1.090E+00	1.014E+01	2.500E+01
39	2.480E+00	6.988E+00	2.005E-01	0.000E+00	0.000E+00	1.796E-02	1.098E+00	2.355E+01	2.500E+01
40	2.453E+00	1.030E-01	7.879E-03	0.000E+00	0.000E+00	1.802E-02	1.086E+00	2.347E+01	2.500E+01
41	2.351E+00	1.553E-03	3.207E-04	0.000E+00	0.000E+00	1.808E-02	1.082E+00	2.339E+01	2.500E+01
42	2.182E+00	2.584E-05	1.468E-05	0.000E+00	0.000E+00	1.819E-02	1.076E+00	2.326E+01	2.500E+01
43	1.916E+00	5.152E-07	8.278E-07	0.000E+00	0.000E+00	1.835E-02	1.066E+00	2.306E+01	2.500E+01
44	1.516E+00	1.437E-08	6.699E-08	0.000E+00	0.000E+00	1.859E-02	1.052E+00	2.276E+01	2.500E+01
45	9.612E-01	7.254E-10	9.320E-09	0.000E+00	0.000E+00	1.892E-02	1.033E+00	2.236E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	5.169E-04	1.769E-11	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
2	5.169E-04	6.645E-10	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.590E-07
3	5.169E-04	2.431E-08	2.727E-15	2.735E-02	8.810E-03	1.379E-02	8.171E-01	8.001E+01	1.063E-06
4	5.169E-04	8.890E-07	3.123E-13	2.735E-02	8.810E-03	1.379E-02	8.171E-01	8.001E+01	9.108E-07
5	5.172E-04	3.251E-05	3.545E-11	2.737E-02	8.817E-03	1.379E-02	8.171E-01	8.001E+01	6.838E-05
6	5.240E-04	1.188E-03	4.021E-09	2.790E-02	8.986E-03	1.393E-02	8.171E-01	8.001E+01	6.175E-05
7	6.371E-04	4.257E-02	4.475E-07	3.936E-02	1.268E-02	1.667E-02	8.172E-01	8.001E+01	2.290E-04
8	1.240E-03	1.081E+00	3.528E-05	1.366E-01	4.400E-02	3.177E-02	8.186E-01	8.004E+01	2.809E-03
9	2.069E-03	7.898E+00	7.999E-04	3.773E-01	1.216E-01	5.249E-02	8.277E-01	8.023E+01	3.179E-03
10	2.538E-03	2.084E+01	6.550E-03	6.011E-01	1.939E-01	6.327E-02	8.452E-01	8.059E+01	8.824E-03
11	3.381E-03	3.451E+01	3.362E-02	7.384E-01	2.386E-01	6.596E-02	8.639E-01	8.097E+01	1.023E-02
12	1.465E-02	4.652E+01	1.403E-01	9.499E-01	3.078E-01	6.941E-02	8.809E-01	8.135E+01	1.541E-02
13	1.735E-01	4.863E+01	4.528E-01	3.030E+01	2.562E+00	7.577E-01	8.893E-01	8.192E+01	5.547E-03

14	2.362E-01	4.942E+01	5.176E-01	4.223E+01	2.884E+00	7.757E-01	8.925E-01	8.215E+01	3.077E-02
15	2.632E-01	4.924E+01	5.178E-01	4.777E+01	2.878E+00	7.830E-01	8.931E-01	8.223E+01	1.005E+00
16	2.745E-01	4.918E+01	5.178E-01	5.011E+01	2.873E+00	7.852E-01	8.934E-01	8.227E+01	2.953E-03
17	2.793E-01	4.916E+01	5.186E-01	5.112E+01	2.831E+00	7.859E-01	8.935E-01	8.228E+01	5.144E-02
18	2.813E-01	4.915E+01	5.201E-01	5.155E+01	2.810E+00	7.862E-01	8.936E-01	8.229E+01	7.587E-01
19	2.822E-01	4.916E+01	5.208E-01	5.174E+01	2.778E+00	7.863E-01	8.936E-01	8.229E+01	6.469E-01
20	2.826E-01	4.916E+01	5.217E-01	5.182E+01	2.768E+00	7.864E-01	8.936E-01	8.229E+01	4.082E-02
21	2.828E-01	4.916E+01	5.220E-01	5.187E+01	2.728E+00	7.864E-01	8.937E-01	8.230E+01	8.680E-01
22	2.829E-01	4.916E+01	5.229E-01	5.188E+01	2.719E+00	7.864E-01	8.937E-01	8.230E+01	3.719E-01
23	2.829E-01	4.916E+01	5.228E-01	5.191E+01	2.660E+00	7.864E-01	8.937E-01	8.230E+01	2.677E-01
24	4.674E-01	1.822E+00	5.373E-02	2.054E+01	5.928E-02	2.400E-01	8.331E-01	1.528E+01	1.205E-01
25	4.713E-01	3.169E-02	2.598E-03	2.081E+01	2.892E-03	2.437E-01	8.307E-01	1.528E+01	3.434E-02
26	4.663E-01	5.439E-04	1.241E-04	2.053E+01	1.380E-04	2.439E-01	8.305E-01	1.527E+01	7.595E-02
27	4.586E-01	9.464E-06	6.010E-06	2.009E+01	6.663E-06	2.440E-01	8.303E-01	1.527E+01	8.944E-02
28	4.468E-01	1.683E-07	2.845E-07	1.942E+01	3.147E-07	2.442E-01	8.299E-01	1.526E+01	5.392E-03
29	4.291E-01	3.099E-09	0.000E+00	1.842E+01	0.000E+00	2.444E-01	8.294E-01	1.525E+01	2.271E-02
30	4.028E-01	6.015E-11	0.000E+00	1.697E+01	0.000E+00	2.443E-01	8.286E-01	1.524E+01	1.977E-02
31	3.642E-01	1.267E-12	0.000E+00	1.492E+01	0.000E+00	2.437E-01	8.275E-01	1.521E+01	3.838E-02
32	3.090E-01	2.955E-14	0.000E+00	1.218E+01	0.000E+00	2.411E-01	8.259E-01	1.518E+01	4.511E-02
33	2.325E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.327E-01	8.237E-01	1.514E+01	8.441E-03
34	1.308E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.054E-01	8.208E-01	1.508E+01	3.323E-02
35	2.408E-01	5.997E+01	6.312E-01	4.617E+01	1.661E+01	7.909E-01	9.076E-01	6.701E+01	2.247E-05
36	2.467E-01	6.122E+01	6.688E-01	4.699E+01	1.706E+01	7.773E-01	9.097E-01	6.706E+01	8.103E-06
37	2.596E-01	6.120E+01	6.697E-01	4.968E+01	1.823E+01	7.789E-01	9.101E-01	6.709E+01	0.000E+00
38	2.756E-01	6.109E+01	6.668E-01	5.297E+01	1.971E+01	7.808E-01	9.104E-01	6.713E+01	0.000E+00
39	2.952E-01	6.097E+01	6.635E-01	2.489E+01	9.440E+00	3.396E-01	9.109E-01	6.718E+01	0.000E+00
40	5.552E-01	2.476E+00	7.103E-02	6.806E+01	2.553E+01	6.410E-01	8.366E-01	6.647E+01	1.675E-05
41	5.437E-01	3.642E-02	2.786E-03	6.654E+01	2.465E+01	6.563E-01	8.328E-01	6.638E+01	9.190E-06
42	5.055E-01	5.482E-04	1.132E-04	6.045E+01	2.196E+01	6.600E-01	8.316E-01	6.628E+01	0.000E+00
43	4.428E-01	9.090E-06	5.162E-06	5.060E+01	1.788E+01	6.628E-01	8.298E-01	6.612E+01	5.422E-06
44	3.444E-01	1.801E-07	2.866E-07	3.628E+01	1.238E+01	6.573E-01	8.269E-01	6.587E+01	1.447E-05
45	1.988E-01	4.744E-09	2.009E-08	1.916E+01	6.317E+00	6.060E-01	8.228E-01	6.550E+01	9.617E-07

TIME = 526.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	3.000E-02	2.494E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
2	3.000E-02	9.370E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
3	3.000E-02	3.429E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
4	3.000E-02	1.254E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
5	3.000E-02	4.586E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
6	3.001E-02	1.675E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
7	3.014E-02	5.928E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.981E-01	1.000E+02	2.500E+01
8	3.068E-02	1.299E+00	6.859E-14	0.000E+00	0.000E+00	0.000E+00	9.998E-01	1.000E+02	2.500E+01
9	3.125E-02	7.753E+00	1.288E-12	0.000E+00	0.000E+00	0.000E+00	1.009E+00	1.002E+02	2.500E+01
10	3.154E-02	1.848E+01	9.495E-12	0.000E+00	0.000E+00	0.000E+00	1.023E+00	1.006E+02	2.500E+01
11	3.294E-02	2.934E+01	4.639E-11	0.000E+00	0.000E+00	0.000E+00	1.038E+00	1.009E+02	2.500E+01
12	5.424E-02	3.816E+01	1.856E-10	0.000E+00	0.000E+00	0.000E+00	1.051E+00	1.013E+02	2.500E+01
12	PRODUCT STREAM							\ 1.013E+02	
13	3.147E-01	2.904E+01	4.327E-10	5.670E-06	6.934E-02	6.934E-02	1.060E+00	1.413E+01	2.500E+01
14	3.540E-01	3.142E+01	1.812E-06	8.038E-03	6.917E-02	6.921E-02	1.065E+00	1.416E+01	2.500E+01
15	4.146E-01	2.917E+01	2.366E-03	2.560E-01	6.805E-02	6.912E-02	1.064E+00	1.418E+01	2.500E+01
16	4.950E-01	2.554E+01	6.677E-02	1.149E+00	6.421E-02	6.902E-02	1.064E+00	1.420E+01	2.500E+01
17	5.921E-01	2.206E+01	2.718E-01	2.062E+00	6.025E-02	6.888E-02	1.064E+00	1.423E+01	2.500E+01
18	7.081E-01	1.891E+01	4.482E-01	2.570E+00	5.793E-02	6.869E-02	1.065E+00	1.427E+01	2.500E+01
19	8.455E-01	1.590E+01	4.891E-01	2.785E+00	5.680E-02	6.845E-02	1.066E+00	1.432E+01	2.500E+01
20	1.005E+00	1.312E+01	4.396E-01	2.855E+00	5.622E-02	6.816E-02	1.067E+00	1.438E+01	2.500E+01
21	1.185E+00	1.070E+01	3.618E-01	2.868E+00	5.582E-02	6.782E-02	1.070E+00	1.445E+01	2.500E+01
22	1.388E+00	8.681E+00	2.875E-01	2.861E+00	5.546E-02	6.743E-02	1.074E+00	1.453E+01	2.500E+01
23	1.618E+00	7.036E+00	2.260E-01	2.844E+00	5.506E-02	6.696E-02	1.080E+00	1.464E+01	2.500E+01
24	1.642E+00	4.604E-01	4.244E-02	2.848E+00	5.514E-02	6.706E-02	1.071E+00	1.461E+01	2.500E+01
25	1.644E+00	2.777E-02	7.350E-03	2.848E+00	5.515E-02	6.706E-02	1.070E+00	1.461E+01	2.500E+01
26	1.644E+00	1.666E-03	1.266E-03	2.848E+00	5.515E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
27	1.644E+00	9.988E-05	2.178E-04	2.849E+00	5.515E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
28	1.644E+00	5.989E-06	3.747E-05	2.849E+00	5.514E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
29	1.644E+00	3.592E-07	6.424E-06	2.849E+00	5.514E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
30	1.643E+00	2.156E-08	1.080E-06	2.850E+00	5.515E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
31	1.638E+00	1.299E-09	1.594E-07	2.850E+00	5.515E-02	6.708E-02	1.070E+00	1.461E+01	2.500E+01
32	1.619E+00	7.952E-11	0.000E+00	2.852E+00	5.519E-02	6.712E-02	1.070E+00	1.460E+01	2.500E+01
33	1.544E+00	5.168E-12	0.000E+00	2.859E+00	5.532E-02	6.728E-02	1.067E+00	1.457E+01	2.500E+01
34	1.254E+00	4.124E-13	0.000E+00	2.886E+00	5.584E-02	6.792E-02	1.057E+00	1.443E+01	2.500E+01
34	PRODUCT STREAM							\ 1.443E+01	
35	2.032E+00	8.669E+00	2.537E-01	0.000E+00	0.000E+00	0.000E+00	1.080E+00	1.004E+01	2.500E+01
36	2.114E+00	8.678E+00	2.612E-01	0.000E+00	0.000E+00	0.000E+00	1.083E+00	1.007E+01	2.500E+01
37	2.214E+00	8.184E+00	2.441E-01	0.000E+00	0.000E+00	0.000E+00	1.086E+00	1.010E+01	2.500E+01
38	2.337E+00	7.636E+00	2.240E-01	0.000E+00	0.000E+00	0.000E+00	1.090E+00	1.014E+01	2.500E+01
39	2.480E+00	6.988E+00	2.005E-01	0.000E+00	0.000E+00	1.796E-02	1.098E+00	2.355E+01	2.500E+01
40	2.453E+00	1.030E-01	7.879E-03	0.000E+00	0.000E+00	1.802E-02	1.086E+00	2.347E+01	2.500E+01
41	2.351E+00	1.553E-03	3.207E-04	0.000E+00	0.000E+00	1.808E-02	1.082E+00	2.339E+01	2.500E+01
42	2.182E+00	2.584E-05	1.468E-05	0.000E+00	0.000E+00	1.819E-02	1.076E+00	2.326E+01	2.500E+01

43	1.916E+00	5.152E-07	8.278E-07	0.000E+00	0.000E+00	1.835E-02	1.066E+00	2.306E+01	2.500E+01
44	1.516E+00	1.437E-08	6.699E-08	0.000E+00	0.000E+00	1.859E-02	1.052E+00	2.276E+01	2.500E+01
45	9.612E-01	7.254E-10	9.320E-09	0.000E+00	0.000E+00	1.892E-02	1.033E+00	2.236E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	5.169E-04	8.526E-13	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
2	5.169E-04	3.203E-11	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.590E-07
3	5.169E-04	1.172E-09	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.590E-07
4	5.169E-04	4.287E-08	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	1.063E-06
5	5.169E-04	1.568E-06	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	5.360E-06
6	5.174E-04	5.733E-05	0.000E+00	2.738E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	9.134E-03
7	5.283E-04	2.094E-03	0.000E+00	2.826E-02	0.000E+00	1.402E-02	8.171E-01	8.001E+01	7.904E-03
8	6.906E-04	7.410E-02	1.261E-15	4.564E-02	1.470E-02	1.800E-02	8.172E-01	8.001E+01	5.778E-03
9	1.379E-03	1.623E+00	8.686E-14	1.672E-01	5.386E-02	3.523E-02	8.193E-01	8.005E+01	3.327E-03
10	2.172E-03	9.682E+00	1.603E-12	4.181E-01	1.348E-01	5.496E-02	8.301E-01	8.028E+01	1.477E-03
11	2.641E-03	2.305E+01	1.176E-11	6.280E-01	2.026E-01	6.408E-02	8.482E-01	8.065E+01	7.213E-04
12	4.506E-03	3.654E+01	5.743E-11	7.664E-01	2.477E-01	6.649E-02	8.666E-01	8.103E+01	6.078E-04
13	3.111E-02	4.746E+01	2.299E-10	9.413E+00	2.336E-04	5.696E-01	8.825E-01	8.142E+01	1.086E-03
14	3.408E-02	5.240E+01	9.845E-07	9.605E+00	7.053E-04	5.546E-01	8.894E-01	8.157E+01	6.544E-03
15	4.099E-02	5.281E+01	1.398E-03	1.042E+01	3.114E-02	5.690E-01	8.902E-01	8.160E+01	4.403E-03
16	5.126E-02	5.259E+01	4.497E-02	1.184E+01	2.127E-01	5.954E-01	8.903E-01	8.163E+01	4.371E-03
17	6.422E-02	5.255E+01	2.125E-01	1.368E+01	5.227E-01	6.226E-01	8.909E-01	8.168E+01	5.312E-03
18	8.015E-02	5.253E+01	4.104E-01	1.591E+01	7.789E-01	6.485E-01	8.917E-01	8.174E+01	5.981E-03
19	1.000E-01	5.225E+01	5.330E-01	1.877E+01	9.300E-01	6.757E-01	8.922E-01	8.180E+01	6.706E-03
20	1.241E-01	5.181E+01	5.802E-01	2.248E+01	1.003E+00	7.034E-01	8.924E-01	8.186E+01	4.037E-03
21	1.524E-01	5.133E+01	5.861E-01	2.720E+01	1.029E+00	7.293E-01	8.926E-01	8.194E+01	2.617E-03
22	1.849E-01	5.087E+01	5.769E-01	3.307E+01	1.034E+00	7.518E-01	8.930E-01	8.203E+01	4.253E-03
23	2.218E-01	5.046E+01	5.652E-01	4.025E+01	1.033E+00	7.696E-01	8.936E-01	8.214E+01	3.042E-03
24	3.660E-01	6.752E+00	2.164E-01	1.530E+01	7.814E-02	2.326E-01	8.371E-01	1.525E+01	1.577E-03
25	3.877E-01	4.418E-01	4.065E-02	1.658E+01	1.483E-02	2.458E-01	8.289E-01	1.523E+01	1.936E-03
26	3.893E-01	2.665E-02	7.038E-03	1.667E+01	2.574E-03	2.467E-01	8.283E-01	1.523E+01	3.020E-03
27	3.894E-01	1.598E-03	1.212E-03	1.668E+01	4.433E-04	2.468E-01	8.282E-01	1.523E+01	3.981E-03
28	3.894E-01	9.584E-05	2.084E-04	1.668E+01	7.624E-05	2.468E-01	8.282E-01	1.523E+01	4.510E-03
29	3.893E-01	5.746E-06	3.573E-05	1.667E+01	1.307E-05	2.468E-01	8.282E-01	1.523E+01	2.123E-03
30	3.890E-01	3.446E-07	5.999E-06	1.666E+01	2.194E-06	2.468E-01	8.282E-01	1.523E+01	6.215E-04
31	3.878E-01	2.068E-08	8.815E-07	1.659E+01	3.224E-07	2.468E-01	8.282E-01	1.523E+01	5.967E-04
32	3.831E-01	1.246E-09	0.000E+00	1.634E+01	0.000E+00	2.467E-01	8.281E-01	1.522E+01	1.702E-03
33	3.643E-01	7.590E-11	0.000E+00	1.534E+01	0.000E+00	2.464E-01	8.275E-01	1.521E+01	3.573E-03
34	2.896E-01	4.569E-12	0.000E+00	1.165E+01	0.000E+00	2.427E-01	8.254E-01	1.517E+01	4.616E-03
35	2.408E-01	5.997E+01	6.312E-01	4.617E+01	1.661E+01	7.909E-01	9.076E-01	6.701E+01	2.247E-05
36	2.467E-01	6.122E+01	6.688E-01	4.699E+01	1.706E+01	7.773E-01	9.097E-01	6.706E+01	8.103E-06
37	2.596E-01	6.120E+01	6.697E-01	4.968E+01	1.823E+01	7.789E-01	9.101E-01	6.709E+01	0.000E+00
38	2.756E-01	6.109E+01	6.668E-01	5.297E+01	1.971E+01	7.808E-01	9.104E-01	6.713E+01	0.000E+00
39	2.952E-01	6.097E+01	6.635E-01	2.489E+01	9.440E+00	3.396E-01	9.109E-01	6.718E+01	0.000E+00
40	5.552E-01	2.476E+00	7.103E-02	6.806E+01	2.553E+01	6.410E-01	8.366E-01	6.647E+01	1.675E-05
41	5.437E-01	3.642E-02	2.786E-03	6.654E+01	2.465E+01	6.563E-01	8.328E-01	6.638E+01	9.190E-06
42	5.055E-01	5.482E-04	1.132E-04	6.045E+01	2.196E+01	6.600E-01	8.316E-01	6.628E+01	0.000E+00
43	4.428E-01	9.090E 06	5.162E-06	5.060E+01	1.788E+01	6.628E-01	8.298E-01	6.612E+01	2.092E-05
44	3.444E-01	1.801E-07	2.866E-07	3.628E+01	1.238E+01	6.573E-01	8.269E-01	6.587E+01	1.447E-05
45	1.988E-01	4.744E-09	2.009E-08	1.916E+01	6.317E+00	6.060E-01	8.228E-01	6.550E+01	9.617E-07

A.3 MFRF in Raffinate Diversion Scenario

1CALCULATIONS FOR A SOLVENT EXTRACTION PROCESS HAVING INTERACTING SOLUTES

GENERATED PROFILE
THIS IS A DIVERSION THROUGH THE RAFFINATE STREAM
FROM THE FIRST CYCLE IN THE MODEL FUEL RECYCLING FACILITY
THE ORGANIC PHASE FLOWRATE WAS INCREASED TO THE MAXIMUM, AND
AQUEOUS FLOWRATES WERE GREATLY DECREASED IN ORDER TO CREATE
THE DIVERSION.
DTHETA = 1.000 MINUTES PER TIME INCREMENT
DPRINT = 5001.000 MINUTES WEIWEEN PRINTING OF PROFILES
IFAST = 0 THE RUNGE-KUTTA INTEGRATION WILL BE USED
THIS TIME PERIOD WILL END WHEN TIME = TSTOP = 1000.000 MINUTES OR A TOLERANCE OF TOL = 0.0100 % PER MINUTE IS REACHED
NUMBER OF STAGES = 45
NEWIN = 1 NEW INPUT FLOWS WILL BE GIVEN
NEWOUT = 1 NEW OUTPUT FLOWS WILL BE GIVEN
NEWOUT = 1 INVALID VALUE
IVOLM = 3 MIXER VOLUMES DETERMINED BY PHASE FLOW
IVOLS = 3 SETTLE VOLUMES GIVEN BY PHASE FLOW
IPRO = 0 A NEW INITIAL PROFILE WILL NOT BE READ
IPNCH = 0 NO PUNCHED CARD OUTPUT
NSTR = 1 ROUTING PATTERN OTHER THAN NORMAL
ORGANIC STREAM EXITING AT STAGE 35 FEEDS STAGE 23
TEMPI = 2.500E+01 INITIAL & DEFAULT TEMPERATURE
IRXN = 3 REDUCTION OF PLUTONIUM BY HYDROXYLAMINE

FEED & PRODUCT STREAM DATA	STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	FLOW RATE (L/MIN)	TEMP (C)
AQUEOUS	1	3.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+02	25.0
AQUEOUS	13	3.000E-01	0.000E+00	0.000E+00	0.000E+00	7.000E-02	7.000E-02	1.400E+01	25.0
30.0 % TBP	34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.500E+01	25.0
AQUEOUS	35	2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+01	25.0
AQUEOUS	39	1.250E+00	2.850E+02	3.000E+00	0.000E+00	0.000E+00	3.000E-02	1.410E+01	25.0
30.0 % TBP	45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.500E+01	25.0
AQUEOUS	12	PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS)						5.000E+03	
AQUEOUS	34	PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS)						5.000E+03	

STAGE NO.	MIXER VOLUME BY PHASE		SETTLER VOLUME BY PHASE		MIXER FLOW RATE		INTERSTAGE FLOW RATE	
	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC
1	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
2	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
3	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
4	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
5	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
6	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
7	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
8	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
9	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
10	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
11	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
12	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	0.000E+00	7.931E+01
13	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
14	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
15	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
16	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
17	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
18	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
19	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
20	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
21	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
22	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
23	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
24	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
25	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
26	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
27	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
28	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
29	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
30	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
31	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
32	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
33	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
34	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	0.000E+00	1.487E+01
35	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
36	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
37	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01

38	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
39	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
40	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
41	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
42	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
43	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
44	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
45	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01

TRANSIENT BEHAVIOR RESULTS MIXER CONCENTRATIONS GIVEN

TIME = 0.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
7	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
8	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
9	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
12	PRODUCT STREAM						\	9.991E+01	
13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
25	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
30	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
31	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
32	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
33	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
34	PRODUCT STREAM						\	1.384E+01	
35	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.382E+00	2.500E+01
36	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.382E+00	2.500E+01
37	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.382E+00	2.500E+01
38	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.382E+00	2.500E+01
39	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
40	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
41	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
42	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
43	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
44	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
7	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
8	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
9	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02

17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
25	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
30	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
31	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
32	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
33	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
35	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
36	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
37	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
38	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
39	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
40	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
41	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
42	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
43	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
44	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02

TIME = 526.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	3.000E-02	2.527E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
2	3.000E-02	9.490E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
3	3.000E-02	3.472E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
4	3.000E-02	1.269E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
5	3.000E-02	4.640E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
6	3.001E-02	1.694E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
7	3.014E-02	5.991E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.981E-01	1.000E+02	2.500E+01
8	3.068E-02	1.308E+00	1.946E-14	0.000E+00	0.000E+00	0.000E+00	9.998E-01	1.000E+02	2.500E+01
9	3.126E-02	7.780E+00	3.655E-13	0.000E+00	0.000E+00	0.000E+00	1.009E+00	1.002E+02	2.500E+01
10	3.154E-02	1.852E+01	2.711E-12	0.000E+00	0.000E+00	0.000E+00	1.023E+00	1.006E+02	2.500E+01
11	3.293E-02	2.936E+01	1.340E-11	0.000E+00	0.000E+00	0.000E+00	1.038E+00	1.009E+02	2.500E+01
12	5.420E-02	3.818E+01	5.425E-11	0.000E+00	0.000E+00	0.000E+00	1.051E+00	1.013E+02	2.500E+01
12	PRODUCT STREAM							\ 1.013E+02	
13	3.143E-01	2.908E+01	1.275E-10	1.670E-06	6.934E-02	6.934E-02	1.060E+00	1.413E+01	2.500E+01
14	3.532E-01	3.148E+01	5.345E-07	7.108E-03	6.918E-02	6.921E-02	1.065E+00	1.416E+01	2.500E+01
15	4.132E-01	2.926E+01	2.098E-03	2.422E-01	6.811E-02	6.912E-02	1.065E+00	1.418E+01	2.500E+01
16	4.931E-01	2.563E+01	6.336E-02	1.124E+00	6.432E-02	6.902E-02	1.064E+00	1.420E+01	2.500E+01
17	5.899E-01	2.214E+01	2.663E-01	2.046E+00	6.032E-02	6.888E-02	1.064E+00	1.423E+01	2.500E+01
18	7.057E-01	1.898E+01	4.454E-01	2.564E+00	5.796E-02	6.869E-02	1.065E+00	1.427E+01	2.500E+01
19	8.430E-01	1.596E+01	4.893E-01	2.784E+00	5.680E-02	6.845E-02	1.066E+00	1.432E+01	2.500E+01
20	1.002E+00	1.316E+01	4.409E-01	2.854E+00	5.623E-02	6.817E-02	1.067E+00	1.438E+01	2.500E+01
21	1.183E+00	1.073E+01	3.628E-01	2.866E+00	5.583E-02	6.783E-02	1.070E+00	1.445E+01	2.500E+01
22	1.387E+00	8.696E+00	2.881E-01	2.859E+00	5.547E-02	6.743E-02	1.074E+00	1.453E+01	2.500E+01
23	1.617E+00	7.043E+00	2.263E-01	2.842E+00	5.507E-02	6.696E-02	1.080E+00	1.463E+01	2.500E+01
24	1.641E+00	4.613E-01	4.254E-02	2.846E+00	5.515E-02	6.706E-02	1.071E+00	1.461E+01	2.500E+01
25	1.643E+00	2.785E-02	7.375E-03	2.847E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
26	1.643E+00	1.672E-03	1.272E-03	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
27	1.643E+00	1.004E-04	2.192E-04	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
28	1.643E+00	6.028E-06	3.779E-05	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
29	1.643E+00	3.620E-07	6.512E-06	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
30	1.641E+00	2.177E-08	1.119E-06	2.845E+00	5.517E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
31	1.637E+00	1.314E-09	1.892E-07	2.845E+00	5.518E-02	6.708E-02	1.070E+00	1.461E+01	2.500E+01
32	1.618E+00	8.055E-11	2.840E-08	2.846E+00	5.521E-02	6.712E-02	1.069E+00	1.460E+01	2.500E+01
33	1.543E+00	5.246E-12	0.000E+00	2.853E+00	5.535E-02	6.729E-02	1.067E+00	1.456E+01	2.500E+01
34	1.253E+00	4.194E-13	0.000E+00	2.880E+00	5.587E-02	6.792E-02	1.057E+00	1.443E+01	2.500E+01
34	PRODUCT STREAM							\ 1.443E+01	
35	2.032E+00	8.669E+00	2.537E-01	0.000E+00	0.000E+00	0.000E+00	1.080E+00	1.004E+01	2.500E+01
36	2.114E+00	8.678E+00	2.612E-01	0.000E+00	0.000E+00	0.000E+00	1.083E+00	1.007E+01	2.500E+01
37	2.214E+00	8.184E+00	2.441E-01	0.000E+00	0.000E+00	0.000E+00	1.086E+00	1.010E+01	2.500E+01
38	2.337E+00	7.636E+00	2.240E-01	0.000E+00	0.000E+00	0.000E+00	1.090E+00	1.014E+01	2.500E+01
39	2.480E+00	6.988E+00	2.005E-01	0.000E+00	0.000E+00	1.796E-02	1.098E+00	2.355E+01	2.500E+01
40	2.453E+00	1.030E-01	7.879E-03	0.000E+00	0.000E+00	1.802E-02	1.086E+00	2.347E+01	2.500E+01
41	2.351E+00	1.553E-03	3.207E-04	0.000E+00	0.000E+00	1.808E-02	1.082E+00	2.339E+01	2.500E+01
42	2.182E+00	2.584E-05	1.468E-05	0.000E+00	0.000E+00	1.819E-02	1.076E+00	2.326E+01	2.500E+01
43	1.916E+00	5.152E-07	8.278E-07	0.000E+00	0.000E+00	1.835E-02	1.066E+00	2.306E+01	2.500E+01
44	1.516E+00	1.437E-08	6.699E-08	0.000E+00	0.000E+00	1.859E-02	1.052E+00	2.276E+01	2.500E+01
45	9.612E-01	7.254E-10	9.320E-09	0.000E+00	0.000E+00	1.892E-02	1.033E+00	2.236E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	5.169E-04	8.638E-13	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
2	5.169E-04	3.244E-11	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.590E-07
3	5.169E-04	1.187E-09	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.590E-07
4	5.169E-04	4.339E-08	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	1.214E-06
5	5.169E-04	1.586E-06	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	5.056E-06
6	5.174E-04	5.799E-05	0.000E+00	2.738E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.544E-03
7	5.284E-04	2.117E-03	0.000E+00	2.827E-02	0.000E+00	1.403E-02	8.171E-01	8.001E+01	7.679E-03
8	6.918E-04	7.487E-02	3.589E-16	4.578E-02	1.475E-02	1.803E-02	8.172E-01	8.001E+01	5.409E-03
9	1.381E-03	1.634E+00	2.474E-14	1.678E-01	5.405E-02	3.529E-02	8.193E-01	8.005E+01	2.775E-03
10	2.173E-03	9.714E+00	4.585E-13	4.188E-01	1.350E-01	5.500E-02	8.302E-01	8.028E+01	1.386E-03
11	2.641E-03	2.309E+01	3.401E-12	6.284E-01	2.028E-01	6.409E-02	8.482E-01	8.065E+01	6.180E-04
12	4.503E-03	3.657E+01	1.679E-11	7.665E-01	2.477E-01	6.649E-02	8.667E-01	8.103E+01	4.938E-04
13	3.106E-02	4.748E+01	6.770E-11	9.407E+00	2.336E-04	5.693E-01	8.825E-01	8.142E+01	8.979E-04
14	3.398E-02	5.243E+01	2.900E-07	9.592E+00	2.350E-04	5.542E-01	8.894E-01	8.157E+01	7.245E-03
15	4.080E-02	5.284E+01	1.236E-03	1.039E+01	2.912E-02	5.684E-01	8.902E-01	8.160E+01	3.207E-03
16	5.100E-02	5.261E+01	4.253E-02	1.180E+01	2.060E-01	5.946E-01	8.903E-01	8.163E+01	2.898E-03
17	6.391E-02	5.257E+01	2.075E-01	1.363E+01	5.153E-01	6.220E-01	8.909E-01	8.168E+01	2.887E-03
18	7.981E-02	5.254E+01	4.065E-01	1.586E+01	7.738E-01	6.479E-01	8.917E-01	8.173E+01	2.567E-03
19	9.962E-02	5.227E+01	5.315E-01	1.872E+01	9.277E-01	6.752E-01	8.922E-01	8.180E+01	2.161E-03
20	1.237E-01	5.183E+01	5.803E-01	2.242E+01	1.003E+00	7.029E-01	8.924E-01	8.186E+01	2.890E-03
21	1.521E-01	5.134E+01	5.864E-01	2.714E+01	1.030E+00	7.290E-01	8.926E-01	8.194E+01	3.191E-03
22	1.847E-01	5.087E+01	5.771E-01	3.302E+01	1.035E+00	7.516E-01	8.930E-01	8.203E+01	3.106E-03
23	2.217E-01	5.046E+01	5.653E-01	4.021E+01	1.034E+00	7.695E-01	8.936E-01	8.214E+01	3.821E-03
24	3.657E-01	6.758E+00	2.167E-01	1.529E+01	7.828E-02	2.325E-01	8.371E-01	1.525E+01	3.466E-03
25	3.875E-01	4.427E-01	4.075E-02	1.657E+01	1.488E-02	2.458E-01	8.289E-01	1.523E+01	1.866E-03
26	3.890E-01	2.673E-02	7.064E-03	1.665E+01	2.585E-03	2.467E-01	8.283E-01	1.523E+01	2.513E-03
27	3.891E-01	1.605E-03	1.218E-03	1.666E+01	4.459E-04	2.468E-01	8.282E-01	1.523E+01	3.588E-03
28	3.891E-01	9.636E-05	2.100E-04	1.666E+01	7.687E-05	2.468E-01	8.282E-01	1.523E+01	5.311E-03
29	3.890E-01	5.785E-06	3.617E-05	1.665E+01	1.325E-05	2.468E-01	8.282E-01	1.523E+01	7.476E-03
30	3.887E-01	3.475E-07	6.211E-06	1.664E+01	2.275E-06	2.468E-01	8.282E-01	1.523E+01	7.544E-03
31	3.875E-01	2.089E-08	1.045E-06	1.657E+01	3.829E-07	2.467E-01	8.282E-01	1.523E+01	5.589E-03
32	3.827E-01	1.261E-09	1.541E-07	1.632E+01	5.646E-08	2.467E-01	8.281E-01	1.522E+01	2.936E-03
33	3.639E-01	7.693E-11	0.000E+00	1.532E+01	0.000E+00	2.464E-01	8.275E-01	1.521E+01	8.526E-04
34	2.892E-01	4.639E-12	0.000E+00	1.163E+01	0.000E+00	2.426E-01	8.254E-01	1.517E+01	4.863E-04
35	2.408E-01	5.997E+01	6.312E-01	4.617E+01	1.661E+01	7.909E-01	9.076E-01	6.701E+01	2.247E-05
36	2.467E-01	6.122E+01	6.688E-01	4.699E+01	1.706E+01	7.773E-01	9.097E-01	6.706E+01	8.103E-06
37	2.596E-01	6.120E+01	6.697E-01	4.968E+01	1.823E+01	7.789E-01	9.101E-01	6.709E+01	0.000E+00
38	2.756E-01	6.109E+01	6.668E-01	5.297E+01	1.971E+01	7.808E-01	9.104E-01	6.713E+01	0.000E+00
39	2.952E-01	6.097E+01	6.635E-01	2.489E+01	9.440E+00	3.396E-01	9.109E-01	6.718E+01	0.000E+00
40	5.552E-01	2.476E+00	7.103E-02	6.806E+01	2.553E+01	6.410E-01	8.366E-01	6.647E+01	1.675E-05
41	5.437E-01	3.642E-02	2.786E-03	6.654E+01	2.465E+01	6.563E-01	8.328E-01	6.638E+01	9.190E-06
42	5.055E-01	5.482E-04	1.132E-04	6.045E+01	2.196E+01	6.600E-01	8.316E-01	6.628E+01	0.000E+00
43	4.428E-01	9.090E-06	5.162E-06	5.060E+01	1.788E+01	6.628E-01	8.298E-01	6.612E+01	5.422E-06
44	3.444E-01	1.801E-07	2.866E-07	3.628E+01	1.238E+01	6.573E-01	8.269E-01	6.587E+01	1.447E-05
45	1.988E-01	4.744E-09	2.009E-08	1.916E+01	6.317E+00	6.060E-01	8.228E-01	6.550E+01	9.617E-07

1CALCULATIONS FOR A SOLVENT EXTRACTION PROCESS HAVING INTERACTING SOLUTES

GENERATED PROFILE
THIS IS A DIVERSION THROUGH THE RAFFINATE STREAM
FROM THE FIRST CYCLE IN THE MODEL FUEL RECYCLING FACILITY
THE ORGANIC PHASE FLOWRATE WAS INCREASED TO THE MAXIMUM, AND
AQUEOUS FLOWRATES WERE GREATLY DECREASED IN ORDER TO CREATE
THE DIVERSION.
DTHETA = 1.000 MINUTES PER TIME INCREMENT
DPRINT = 5001.000 MINUTES WEIWEEN PRINTING OF PROFILES
IFAST = 0 THE RUNGE-KUTTA INTEGRATION WILL BE USED
THIS TIME PERIOD WILL END WHEN TIME = TSTOP = 1440.000 MINUTES OR A TOLERANCE OF TOL = 0.0100 % PER MINUTE IS REACHED
NUMBER OF STAGES = 45
NEWIN = 1 NEW INPUT FLOWS WILL BE GIVEN
NEWOUT = 1 NEW OUTPUT FLOWS WILL BE GIVEN
NEWOUT = 1 INVALID VALUE
IVOLM = 3 MIXER VOLUMES DETERMINED BY PHASE FLOW
IVOLS = 3 SETTLE VOLUMES GIVEN BY PHASE FLOW
IPRO = 0 A NEW INITIAL PROFILE WILL NOT BE READ
IPNCH = 0 NO PUNCHED CARD OUTPUT
NSIR = 1 ROUTING PATTERN OTHER THAN NORMAL
ORGANIC STREAM EXITING AT STAGE 35 FEEDS STAGE 23
TEMPI = 2.500E+01 INITIAL & DEFAULT TEMPERATURE
IRXN = 3 REDUCTION OF PLUTONIUM BY HYDROXYLAMINE

FEED & PRODUCT STREAM DATA	STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	FLOW RATE (L/MIN)	TEMP (C)
AQUEOUS	1	3.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+02	25.0
AQUEOUS	13	3.000E-01	0.000E+00	0.000E+00	0.000E+00	7.000E-02	7.000E-02	1.400E+01	25.0
30.0 % TBP	34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.500E+01	25.0
AQUEOUS	35	2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+01	25.0
AQUEOUS	39	1.250E+00	2.850E+02	3.000E+00	0.000E+00	0.000E+00	3.000E-02	1.410E+01	25.0

30.0 % TBP	45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.000E+01	25.0
AQUEOUS	12	PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS)						5.000E+03	
AQUEOUS	34	PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS)						5.000E+03	

STAGE NO.	MIXER VOLUME BY PHASE		SETTLER VOLUME BY PHASE		MIXER FLOW RATE		INTERSTAGE FLOW RATE	
	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC
1	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01
2	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01
3	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01
4	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01
5	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01
6	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01
7	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01
8	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01
9	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01
10	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01
11	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01
12	9.991E+01	4.461E+01	9.991E+01	4.461E+01	9.991E+01	4.461E+01	0.000E+00	4.461E+01
13	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01
14	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01
15	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01
16	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01
17	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01
18	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01
19	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01
20	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01
21	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01
22	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01
23	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01	1.384E+01	4.461E+01
24	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
25	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
26	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
27	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
28	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
29	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
30	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
31	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
32	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
33	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
34	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	0.000E+00	1.487E+01
35	9.382E+00	2.974E+01	9.382E+00	2.974E+01	9.382E+00	2.974E+01	9.382E+00	2.974E+01
36	9.382E+00	2.974E+01	9.382E+00	2.974E+01	9.382E+00	2.974E+01	9.382E+00	2.974E+01
37	9.382E+00	2.974E+01	9.382E+00	2.974E+01	9.382E+00	2.974E+01	9.382E+00	2.974E+01
38	9.382E+00	2.974E+01	9.382E+00	2.974E+01	9.382E+00	2.974E+01	9.382E+00	2.974E+01
39	2.168E+01	2.974E+01	2.168E+01	2.974E+01	2.168E+01	2.974E+01	2.168E+01	2.974E+01
40	2.168E+01	2.974E+01	2.168E+01	2.974E+01	2.168E+01	2.974E+01	2.168E+01	2.974E+01
41	2.168E+01	2.974E+01	2.168E+01	2.974E+01	2.168E+01	2.974E+01	2.168E+01	2.974E+01
42	2.168E+01	2.974E+01	2.168E+01	2.974E+01	2.168E+01	2.974E+01	2.168E+01	2.974E+01
43	2.168E+01	2.974E+01	2.168E+01	2.974E+01	2.168E+01	2.974E+01	2.168E+01	2.974E+01
44	2.168E+01	2.974E+01	2.168E+01	2.974E+01	2.168E+01	2.974E+01	2.168E+01	2.974E+01
45	2.168E+01	2.974E+01	2.168E+01	2.974E+01	2.168E+01	2.974E+01	2.168E+01	2.974E+01

TRANSIENT BEHAVIOR RESULTS MIXER CONCENTRATIONS GIVEN

TIME = 0.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	3.000E-02	2.527E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
2	3.000E-02	9.490E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
3	3.000E-02	3.472E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
4	3.000E-02	1.269E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
5	3.000E-02	4.640E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
6	3.001E-02	1.694E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
7	3.014E-02	5.991E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.981E-01	1.000E+02	2.500E+01
8	3.068E-02	1.308E+00	1.946E-14	0.000E+00	0.000E+00	0.000E+00	9.998E-01	1.000E+02	2.500E+01
9	3.126E-02	7.780E+00	3.655E-13	0.000E+00	0.000E+00	0.000E+00	1.009E+00	1.002E+02	2.500E+01
10	3.154E-02	1.852E+01	2.711E-12	0.000E+00	0.000E+00	0.000E+00	1.023E+00	1.006E+02	2.500E+01
11	3.293E-02	2.936E+01	1.340E-11	0.000E+00	0.000E+00	0.000E+00	1.038E+00	1.009E+02	2.500E+01
12	5.420E-02	3.818E+01	5.425E-11	0.000E+00	0.000E+00	0.000E+00	1.051E+00	1.013E+02	2.500E+01
12	PRODUCT STREAM							\ 1.013E+02	
13	3.143E-01	2.908E+01	1.275E-10	1.670E-06	6.934E-02	6.934E-02	1.060E+00	1.413E+01	2.500E+01
14	3.532E-01	3.148E+01	5.345E-07	7.108E-03	6.918E-02	6.921E-02	1.065E+00	1.416E+01	2.500E+01
15	4.132E-01	2.926E+01	2.098E-03	2.422E-01	6.811E-02	6.912E-02	1.065E+00	1.418E+01	2.500E+01
16	4.931E-01	2.563E+01	6.336E-02	1.124E+00	6.432E-02	6.902E-02	1.064E+00	1.420E+01	2.500E+01
17	5.899E-01	2.214E+01	2.663E-01	2.046E+00	6.032E-02	6.888E-02	1.064E+00	1.423E+01	2.500E+01
18	7.057E-01	1.898E+01	4.454E-01	2.564E+00	5.796E-02	6.869E-02	1.065E+00	1.427E+01	2.500E+01
19	8.430E-01	1.596E+01	4.893E-01	2.784E+00	5.680E-02	6.845E-02	1.066E+00	1.432E+01	2.500E+01
20	1.002E+00	1.316E+01	4.409E-01	2.854E+00	5.623E-02	6.817E-02	1.067E+00	1.438E+01	2.500E+01

21	1.183E+00	1.073E+01	3.628E-01	2.866E+00	5.583E-02	6.783E-02	1.070E+00	1.445E+01	2.500E+01
22	1.387E+00	8.696E+00	2.881E-01	2.859E+00	5.547E-02	6.743E-02	1.074E+00	1.453E+01	2.500E+01
23	1.617E+00	7.043E+00	2.263E-01	2.842E+00	5.507E-02	6.696E-02	1.080E+00	1.463E+01	2.500E+01
24	1.641E+00	4.613E-01	4.254E-02	2.846E+00	5.515E-02	6.706E-02	1.071E+00	1.461E+01	2.500E+01
25	1.643E+00	2.785E-02	7.375E-03	2.847E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
26	1.643E+00	1.672E-03	1.272E-03	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
27	1.643E+00	1.004E-04	2.192E-04	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
28	1.643E+00	6.028E-06	3.779E-05	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
29	1.643E+00	3.620E-07	6.512E-06	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
30	1.641E+00	2.177E-08	1.119E-06	2.845E+00	5.517E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
31	1.637E+00	1.314E-09	1.892E-07	2.845E+00	5.518E-02	6.708E-02	1.070E+00	1.461E+01	2.500E+01
32	1.618E+00	8.055E-11	2.840E-08	2.846E+00	5.521E-02	6.712E-02	1.069E+00	1.460E+01	2.500E+01
33	1.543E+00	5.246E-12	0.000E+00	2.853E+00	5.535E-02	6.729E-02	1.067E+00	1.456E+01	2.500E+01
34	1.253E+00	4.194E-13	0.000E+00	2.880E+00	5.587E-02	6.792E-02	1.057E+00	1.443E+01	2.500E+01
34	PRODUCT STREAM							\ 1.443E+01	
35	2.032E+00	8.669E+00	2.537E-01	0.000E+00	0.000E+00	0.000E+00	1.080E+00	1.004E+01	2.500E+01
36	2.114E+00	8.678E+00	2.612E-01	0.000E+00	0.000E+00	0.000E+00	1.083E+00	1.007E+01	2.500E+01
37	2.214E+00	8.184E+00	2.441E-01	0.000E+00	0.000E+00	0.000E+00	1.086E+00	1.010E+01	2.500E+01
38	2.337E+00	7.636E+00	2.240E-01	0.000E+00	0.000E+00	0.000E+00	1.090E+00	1.014E+01	2.500E+01
39	2.480E+00	6.988E+00	2.005E-01	0.000E+00	0.000E+00	1.796E-02	1.098E+00	2.355E+01	2.500E+01
40	2.453E+00	1.030E-01	7.879E-03	0.000E+00	0.000E+00	1.802E-02	1.086E+00	2.347E+01	2.500E+01
41	2.351E+00	1.553E-03	3.207E-04	0.000E+00	0.000E+00	1.808E-02	1.082E+00	2.339E+01	2.500E+01
42	2.182E+00	2.584E-05	1.468E-05	0.000E+00	0.000E+00	1.819E-02	1.076E+00	2.326E+01	2.500E+01
43	1.916E+00	5.152E-07	8.278E-07	0.000E+00	0.000E+00	1.835E-02	1.066E+00	2.306E+01	2.500E+01
44	1.516E+00	1.437E-08	6.699E-08	0.000E+00	0.000E+00	1.859E-02	1.052E+00	2.276E+01	2.500E+01
45	9.612E-01	7.254E-10	9.320E-09	0.000E+00	0.000E+00	1.892E-02	1.033E+00	2.236E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	5.169E-04	8.638E-13	0.000E+00	1.538E-02	0.000E+00	7.755E-03	8.171E-01	4.500E+01	0.000E+00
2	5.169E-04	3.244E-11	0.000E+00	1.538E-02	0.000E+00	7.755E-03	8.171E-01	4.500E+01	7.590E-07
3	5.169E-04	1.187E-09	0.000E+00	1.538E-02	0.000E+00	7.755E-03	8.171E-01	4.500E+01	7.590E-07
4	5.169E-04	4.339E-08	0.000E+00	1.538E-02	0.000E+00	7.755E-03	8.171E-01	4.500E+01	1.214E-06
5	5.169E-04	1.586E-06	0.000E+00	1.538E-02	0.000E+00	7.754E-03	8.171E-01	4.500E+01	5.056E-06
6	5.174E-04	5.799E-05	0.000E+00	1.540E-02	0.000E+00	7.759E-03	8.171E-01	4.500E+01	7.544E-03
7	5.284E-04	2.117E-03	0.000E+00	1.590E-02	0.000E+00	7.890E-03	8.171E-01	4.500E+01	7.679E-03
8	6.918E-04	7.487E-02	3.589E-16	2.575E-02	8.295E-03	1.014E-02	8.172E-01	4.500E+01	5.409E-03
9	1.381E-03	1.634E+00	2.474E-14	9.437E-02	3.040E-02	1.985E-02	8.193E-01	4.503E+01	2.775E-03
10	2.173E-03	9.714E+00	4.585E-13	2.356E-01	7.594E-02	3.094E-02	8.302E-01	4.516E+01	1.386E-03
11	2.641E-03	2.309E+01	3.401E-12	3.535E-01	1.141E-01	3.605E-02	8.482E-01	4.536E+01	6.180E-04
12	4.503E-03	3.657E+01	1.679E-11	4.311E-01	1.393E-01	3.740E-02	8.667E-01	4.558E+01	4.938E-04
13	3.106E-02	4.748E+01	6.770E-11	5.292E+00	1.314E-04	3.203E-01	8.825E-01	4.580E+01	8.979E-04
14	3.398E-02	5.243E+01	2.900E-07	5.396E+00	1.322E-04	3.117E-01	8.894E-01	4.588E+01	7.245E-03
15	4.080E-02	5.284E+01	1.236E-03	5.847E+00	1.638E-02	3.197E-01	8.902E-01	4.590E+01	3.207E-03
16	5.100E-02	5.261E+01	4.253E-02	6.638E+00	1.159E-01	3.345E-01	8.903E-01	4.592E+01	2.898E-03
17	6.391E-02	5.257E+01	2.075E-01	7.668E+00	2.898E-01	3.499E-01	8.909E-01	4.594E+01	2.887E-03
18	7.981E-02	5.254E+01	4.065E-01	8.921E+00	4.353E-01	3.644E-01	8.917E-01	4.598E+01	2.567E-03
19	9.962E-02	5.227E+01	5.315E-01	1.053E+01	5.218E-01	3.798E-01	8.922E-01	4.601E+01	2.161E-03
20	1.237E-01	5.183E+01	5.803E-01	1.261E+01	5.640E-01	3.954E-01	8.924E-01	4.605E+01	2.890E-03
21	1.521E-01	5.134E+01	5.864E-01	1.526E+01	5.793E-01	4.101E-01	8.926E-01	4.609E+01	3.191E-03
22	1.847E-01	5.087E+01	5.771E-01	1.857E+01	5.822E-01	4.228E-01	8.930E-01	4.614E+01	3.106E-03
23	2.217E-01	5.046E+01	5.653E-01	2.262E+01	5.816E-01	4.328E-01	8.936E-01	4.620E+01	3.821E-03
24	3.657E-01	6.758E+00	2.167E-01	1.529E+01	7.828E-02	2.325E-01	8.371E-01	1.525E+01	3.466E-03
25	3.875E-01	4.427E-01	4.075E-02	1.657E+01	1.488E-02	2.458E-01	8.289E-01	1.523E+01	1.866E-03
26	3.890E-01	2.673E-02	7.064E-03	1.665E+01	2.585E-03	2.467E-01	8.283E-01	1.523E+01	2.513E-03
27	3.891E-01	1.605E-03	1.218E-03	1.666E+01	4.459E-04	2.468E-01	8.282E-01	1.523E+01	3.588E-03
28	3.891E-01	9.636E-05	2.100E-04	1.666E+01	7.687E-05	2.468E-01	8.282E-01	1.523E+01	5.311E-03
29	3.890E-01	5.785E-06	3.617E-05	1.665E+01	1.325E-05	2.468E-01	8.282E-01	1.523E+01	7.476E-03
30	3.887E-01	3.475E-07	6.211E-06	1.664E+01	2.275E-06	2.468E-01	8.282E-01	1.523E+01	7.544E-03
31	3.875E-01	2.089E-08	1.045E-06	1.657E+01	3.829E-07	2.467E-01	8.282E-01	1.523E+01	5.589E-03
32	3.827E-01	1.261E-09	1.541E-07	1.632E+01	5.646E-08	2.467E-01	8.281E-01	1.522E+01	2.936E-03
33	3.639E-01	7.693E-11	0.000E+00	1.532E+01	0.000E+00	2.464E-01	8.275E-01	1.521E+01	8.526E-04
34	2.892E-01	4.639E-12	0.000E+00	1.163E+01	0.000E+00	2.426E-01	8.254E-01	1.517E+01	4.863E-04
35	2.408E-01	5.997E+01	6.312E-01	2.131E+01	7.666E+00	3.650E-01	9.076E-01	3.093E+01	2.247E-05
36	2.467E-01	6.122E+01	6.688E-01	2.169E+01	7.872E+00	3.587E-01	9.097E-01	3.095E+01	8.103E-06
37	2.596E-01	6.120E+01	6.697E-01	2.293E+01	8.412E+00	3.595E-01	9.101E-01	3.097E+01	0.000E+00
38	2.756E-01	6.109E+01	6.668E-01	2.445E+01	9.096E+00	3.603E-01	9.104E-01	3.098E+01	0.000E+00
39	2.952E-01	6.097E+01	6.635E-01	1.149E+01	4.357E+00	1.567E-01	9.109E-01	3.101E+01	0.000E+00
40	5.552E-01	2.476E+00	7.103E-02	3.141E+01	1.178E+01	2.958E-01	8.366E-01	3.068E+01	1.675E-05
41	5.437E-01	3.642E-02	2.786E-03	3.071E+01	1.138E+01	3.029E-01	8.328E-01	3.064E+01	9.190E-06
42	5.055E-01	5.482E-04	1.132E-04	2.790E+01	1.014E+01	3.046E-01	8.316E-01	3.059E+01	0.000E+00
43	4.428E-01	9.090E-06	5.162E-06	2.335E+01	8.254E+00	3.059E-01	8.298E-01	3.052E+01	5.422E-06
44	3.444E-01	1.801E-07	2.866E-07	1.674E+01	5.715E+00	3.034E-01	8.269E-01	3.040E+01	1.447E-05
45	1.988E-01	4.744E-09	2.009E-08	8.844E+00	2.915E+00	2.797E-01	8.228E-01	3.023E+01	9.617E-07

TIME = 293.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	3.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01

2	3.000E-02	4.647E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
3	3.000E-02	3.068E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
4	3.000E-02	1.995E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
5	3.000E-02	1.297E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
6	3.000E-02	8.436E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
7	3.000E-02	5.485E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
8	3.000E-02	3.565E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
9	3.006E-02	2.288E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.981E-01	1.000E+02	2.500E+01
10	3.043E-02	9.943E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.994E-01	1.000E+02	2.500E+01
11	3.116E-02	9.029E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.010E+00	1.003E+02	2.500E+01
12	4.097E-02	2.647E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.035E+00	1.008E+02	2.500E+01
12	PRODUCT STREAM							\ 1.008E+02	
13	2.852E-01	3.963E+01	0.000E+00	0.000E+00	6.918E-02	6.918E-02	1.074E+00	1.417E+01	2.500E+01
14	2.801E-01	5.300E+01	0.000E+00	0.000E+00	6.890E-02	6.890E-02	1.093E+00	1.422E+01	2.500E+01
15	2.780E-01	5.849E+01	0.000E+00	0.000E+00	6.879E-02	6.879E-02	1.101E+00	1.425E+01	2.500E+01
16	2.770E-01	6.093E+01	0.000E+00	0.000E+00	6.874E-02	6.874E-02	1.104E+00	1.426E+01	2.500E+01
17	2.767E-01	6.205E+01	0.000E+00	0.000E+00	6.872E-02	6.872E-02	1.106E+00	1.426E+01	2.500E+01
18	2.767E-01	6.256E+01	0.000E+00	0.000E+00	6.871E-02	6.871E-02	1.106E+00	1.426E+01	2.500E+01
19	2.776E-01	6.275E+01	0.000E+00	0.000E+00	6.870E-02	6.870E-02	1.107E+00	1.426E+01	2.500E+01
20	2.817E-01	6.262E+01	0.000E+00	3.275E-08	6.869E-02	6.869E-02	1.107E+00	1.427E+01	2.500E+01
21	2.984E-01	6.168E+01	2.467E-08	1.847E-04	6.868E-02	6.868E-02	1.106E+00	1.427E+01	2.500E+01
22	3.636E-01	5.782E+01	1.308E-04	5.936E-02	6.837E-02	6.862E-02	1.103E+00	1.428E+01	2.500E+01
23	5.948E-01	4.537E+01	3.335E-02	4.284E-01	6.659E-02	6.838E-02	1.094E+00	1.433E+01	2.500E+01
24	6.301E-01	1.569E+01	1.006E-02	4.516E-01	6.705E-02	6.894E-02	1.053E+00	1.421E+01	2.500E+01
25	6.449E-01	3.895E+00	4.370E-03	4.563E-01	6.725E-02	6.916E-02	1.037E+00	1.417E+01	2.500E+01
26	6.488E-01	8.580E-01	2.197E-03	4.574E-01	6.731E-02	6.922E-02	1.033E+00	1.416E+01	2.500E+01
27	6.497E-01	1.835E-01	1.211E-03	4.577E-01	6.732E-02	6.923E-02	1.032E+00	1.416E+01	2.500E+01
28	6.498E-01	3.897E-02	7.042E-04	4.578E-01	6.732E-02	6.924E-02	1.032E+00	1.415E+01	2.500E+01
29	6.497E-01	8.270E-03	4.199E-04	4.578E-01	6.732E-02	6.924E-02	1.032E+00	1.415E+01	2.500E+01
30	6.492E-01	1.756E-03	2.514E-04	4.578E-01	6.732E-02	6.924E-02	1.032E+00	1.415E+01	2.500E+01
31	6.473E-01	3.734E-04	1.481E-04	4.579E-01	6.733E-02	6.924E-02	1.032E+00	1.415E+01	2.500E+01
32	6.404E-01	7.984E-05	8.374E-05	4.580E-01	6.734E-02	6.926E-02	1.032E+00	1.415E+01	2.500E+01
33	6.152E-01	1.727E-05	4.390E-05	4.584E-01	6.739E-02	6.931E-02	1.031E+00	1.414E+01	2.500E+01
34	5.216E-01	3.759E-06	2.018E-05	4.597E-01	6.759E-02	6.952E-02	1.028E+00	1.410E+01	2.500E+01
34	PRODUCT STREAM							\ 1.410E+01	
35	1.889E+00	2.837E+01	1.902E-01	0.000E+00	0.000E+00	0.000E+00	1.104E+00	1.006E+01	2.500E+01
36	1.823E+00	4.557E+01	3.544E-01	0.000E+00	0.000E+00	0.000E+00	1.127E+00	1.009E+01	2.500E+01
37	1.755E+00	6.323E+01	5.511E-01	0.000E+00	0.000E+00	0.000E+00	1.151E+00	1.013E+01	2.500E+01
38	1.652E+00	9.238E+01	8.971E-01	0.000E+00	0.000E+00	0.000E+00	1.192E+00	1.019E+01	2.500E+01
39	1.419E+00	2.042E+02	2.119E+00	0.000E+00	0.000E+00	1.741E-02	1.365E+00	2.429E+01	2.500E+01
40	1.419E+00	2.042E+02	2.124E+00	0.000E+00	0.000E+00	1.741E-02	1.365E+00	2.429E+01	2.500E+01
41	1.419E+00	2.041E+02	2.142E+00	0.000E+00	0.000E+00	1.741E-02	1.365E+00	2.429E+01	2.500E+01
42	1.419E+00	2.040E+02	2.197E+00	0.000E+00	0.000E+00	1.741E-02	1.365E+00	2.429E+01	2.500E+01
43	1.425E+00	2.024E+02	2.364E+00	0.000E+00	0.000E+00	1.742E-02	1.363E+00	2.429E+01	2.500E+01
44	1.482E+00	1.794E+02	2.663E+00	0.000E+00	0.000E+00	1.751E-02	1.329E+00	2.415E+01	2.500E+01
45	1.442E+00	5.764E+01	1.547E+00	0.000E+00	0.000E+00	1.827E-02	1.136E+00	2.315E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	5.169E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.755E-03	8.171E-01	4.500E+01	0.000E+00
2	5.169E-04	1.589E-16	0.000E+00	1.538E-02	0.000E+00	7.755E-03	8.171E-01	4.500E+01	0.000E+00
3	5.169E-04	1.049E-14	0.000E+00	1.538E-02	0.000E+00	7.755E-03	8.171E-01	4.500E+01	0.000E+00
4	5.169E-04	6.822E-13	0.000E+00	1.538E-02	0.000E+00	7.755E-03	8.171E-01	4.500E+01	0.000E+00
5	5.169E-04	4.435E-11	0.000E+00	1.538E-02	0.000E+00	7.755E-03	8.171E-01	4.500E+01	0.000E+00
6	5.169E-04	2.884E-09	0.000E+00	1.538E-02	0.000E+00	7.755E-03	8.171E-01	4.500E+01	0.000E+00
7	5.169E-04	1.875E-07	0.000E+00	1.538E-02	0.000E+00	7.755E-03	8.171E-01	4.500E+01	0.000E+00
8	5.170E-04	1.219E-05	0.000E+00	1.539E-02	0.000E+00	7.755E-03	8.171E-01	4.500E+01	7.120E-03
9	5.214E-04	7.924E-04	0.000E+00	1.559E-02	0.000E+00	7.807E-03	8.171E-01	4.500E+01	7.324E-03
10	6.470E-04	5.085E-02	0.000E+00	2.301E-02	0.000E+00	9.566E-03	8.172E-01	4.500E+01	4.983E-03
11	1.487E-03	2.209E+00	0.000E+00	1.099E-01	0.000E+00	2.144E-02	8.201E-01	4.504E+01	2.571E-03
12	3.261E-03	1.998E+01	0.000E+00	3.392E-01	0.000E+00	3.576E-02	8.441E-01	4.532E+01	1.627E-03
13	2.513E-02	5.808E+01	0.000E+00	4.755E+00	0.000E+00	2.859E-01	8.970E-01	4.596E+01	1.045E-03
14	2.157E-02	7.002E+01	0.000E+00	4.286E+00	0.000E+00	2.498E-01	9.135E-01	4.614E+01	1.182E-03
15	2.031E-02	7.409E+01	0.000E+00	4.109E+00	0.000E+00	2.370E-01	9.192E-01	4.621E+01	1.217E-03
16	1.979E-02	7.577E+01	0.000E+00	4.033E+00	0.000E+00	2.316E-01	9.216E-01	4.623E+01	1.119E-03
17	1.956E-02	7.652E+01	0.000E+00	3.999E+00	0.000E+00	2.292E-01	9.226E-01	4.624E+01	9.225E-04
18	1.947E-02	7.687E+01	0.000E+00	3.984E+00	0.000E+00	2.281E-01	9.231E-01	4.625E+01	7.205E-04
19	1.949E-02	7.702E+01	0.000E+00	3.980E+00	0.000E+00	2.277E-01	9.233E-01	4.625E+01	5.316E-04
20	1.979E-02	7.708E+01	0.000E+00	3.991E+00	0.000E+00	2.277E-01	9.234E-01	4.625E+01	3.509E-04
21	2.106E-02	7.704E+01	1.012E-08	4.049E+00	1.776E-04	2.288E-01	9.234E-01	4.625E+01	2.416E-04
22	2.621E-02	7.675E+01	5.707E-05	4.299E+00	3.107E-03	2.335E-01	9.232E-01	4.626E+01	9.652E-04
23	4.625E-02	7.559E+01	1.839E-02	5.379E+00	1.286E-01	2.511E-01	9.222E-01	4.628E+01	1.317E-03
24	7.691E-02	4.259E+01	8.940E-03	2.915E+00	2.080E-02	1.311E-01	8.772E-01	1.527E+01	5.038E-03
25	1.059E-01	1.473E+01	5.398E-03	4.042E+00	1.252E-02	1.754E-01	8.400E-01	1.514E+01	2.597E-03
26	1.183E-01	3.658E+00	3.056E-03	4.543E+00	7.085E-03	1.943E-01	8.254E-01	1.509E+01	6.819E-03
27	1.216E-01	8.058E-01	1.735E-03	4.678E+00	4.026E-03	1.993E-01	8.216E-01	1.508E+01	3.547E-03
28	1.223E-01	1.723E-01	1.015E-03	4.707E+00	2.358E-03	2.004E-01	8.208E-01	1.507E+01	2.771E-03
29	1.224E-01	3.660E-02	6.062E-04	4.712E+00	1.409E-03	2.006E-01	8.206E-01	1.507E+01	3.357E-03
30	1.223E-01	7.764E-03	3.627E-04	4.709E+00	8.431E-04	2.006E-01	8.206E-01	1.507E+01	4.833E-03
31	1.218E-01	1.645E-03	2.129E-04	4.692E+00	4.950E-04	2.004E-01	8.206E-01	1.507E+01	5.655E-03

32	1.200E-01	3.472E-04	1.187E-04	4.631E+00	2.760E-04	1.995E-01	8.205E-01	1.507E+01	1.984E-03
33	1.134E-01	7.147E-05	5.919E-05	4.409E+00	1.376E-04	1.964E-01	8.203E-01	1.507E+01	9.268E-04
34	8.939E-02	1.270E-05	2.216E-05	3.608E+00	5.146E-05	1.830E-01	8.196E-01	1.505E+01	3.912E-04
35	1.369E-01	8.636E+01	2.088E-01	9.409E+00	3.394E+00	2.240E-01	9.409E-01	3.108E+01	0.000E+00
36	1.046E-01	9.535E+01	2.698E-01	6.457E+00	2.349E+00	1.771E-01	9.527E-01	3.114E+01	0.000E+00
37	8.499E-02	1.008E+02	3.229E-01	4.909E+00	1.804E+00	1.491E-01	9.600E-01	3.118E+01	1.725E-05
38	6.515E-02	1.065E+02	3.867E-01	3.530E+00	1.320E+00	1.208E-01	9.676E-01	3.122E+01	0.000E+00
39	3.502E-02	1.159E+02	4.998E-01	7.310E-01	3.037E-01	3.179E-02	9.803E-01	3.129E+01	0.000E+00
40	3.502E-02	1.159E+02	5.010E-01	7.310E-01	3.037E-01	3.179E-02	9.803E-01	3.129E+01	0.000E+00
41	3.502E-02	1.159E+02	5.051E-01	7.311E-01	3.037E-01	3.180E-02	9.803E-01	3.129E+01	1.198E-04
42	3.504E-02	1.159E+02	5.183E-01	7.315E-01	3.039E-01	3.181E-02	9.803E-01	3.129E+01	7.265E-06
43	3.533E-02	1.158E+02	5.611E-01	7.367E-01	3.058E-01	3.195E-02	9.802E-01	3.129E+01	8.643E-06
44	3.944E-02	1.145E+02	6.909E-01	8.268E-01	3.360E-01	3.446E-02	9.787E-01	3.128E+01	2.262E-05
45	7.790E-02	9.629E+01	9.159E-01	2.247E+00	7.963E-01	7.267E-02	9.543E-01	3.113E+01	1.265E-05

1CALCULATIONS FOR A SOLVENT EXTRACTION PROCESS HAVING INTERACTING SOLUTES

GENERATED PROFILE
THIS IS A DIVERSION THROUGH THE RAFFINATE STREAM
FROM THE FIRST CYCLE IN THE MODEL FUEL RECYCLING FACILITY
THE ORGANIC PHASE FLOWRATE WAS INCREASED TO THE MAXIMUM, AND
AQUEOUS FLOWRATES WERE GREATLY DECREASED IN ORDER TO CREATE
THE DIVERSION.
DTHETA = 1.000 MINUTES PER TIME INCREMENT
DPRINT = 5001.000 MINUTES WEIWEEN PRINTING OF PROFILES
IFAST = 0 THE RUNGE-KUTTA INTEGRATION WILL BE USED
THIS TIME PERIOD WILL END WHEN TIME = TSTOP = 5000.000 MINUTES OR A TOLERANCE OF TOL = 0.0100 % PER MINUTE IS REACHED
NUMBER OF STAGES = 45
NEWIN = 1 NEW INPUT FLOWS WILL BE GIVEN
NEWOUT = 1 NEW OUTPUT FLOWS WILL BE GIVEN
NEWOUT = 1 INVALID VALUE
IVOLM = 3 MIXER VOLUMES DETERMINED BY PHASE FLOW
IVOLS = 3 SETTLE VOLUMES GIVEN BY PHASE FLOW
IPRO = 0 A NEW INITIAL PROFILE WILL NOT BE READ
IPNCH = 0 NO PUNCHED CARD OUTPUT
NSTR = 1 ROUTING PATTERN OTHER THAN NORMAL
ORGANIC STREAM EXITING AT STAGE 35 FEEDS STAGE 23
TEMPI = 2.500E+01 INITIAL & DEFAULT TEMPERATURE
IRXN = 3 REDUCTION OF PLUTONIUM BY HYDROXYLAMINE

FEED & PRODUCT STREAM DATA	STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	FLOW RATE (L/MIN)	TEMP (C)
AQUEOUS	1	3.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+02	25.0
AQUEOUS	13	3.000E-01	0.000E+00	0.000E+00	0.000E+00	7.000E-02	7.000E-02	1.400E+01	25.0
30.0 % TBP	34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.500E+01	25.0
AQUEOUS	35	2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+01	25.0
AQUEOUS	39	1.250E+00	2.850E+02	3.000E+00	0.000E+00	0.000E+00	3.000E-02	1.410E+01	25.0
30.0 % TBP	45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.500E+01	25.0
AQUEOUS	12	PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS)						5.000E+03	
AQUEOUS	34	PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS)						5.000E+03	

STAGE NO.	MIXER VOLUME BY PHASE AQUEOUS	MIXER VOLUME BY PHASE ORGANIC	SETTLER VOLUME BY PHASE AQUEOUS	SETTLER VOLUME BY PHASE ORGANIC	MIXER FLOW RATE AQUEOUS	MIXER FLOW RATE ORGANIC	INTERSTAGE FLOW RATE AQUEOUS	INTERSTAGE FLOW RATE ORGANIC
1	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
2	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
3	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
4	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
5	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
6	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
7	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
8	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
9	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
10	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
11	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
12	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	0.000E+00	7.931E+01
13	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
14	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
15	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
16	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
17	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
18	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
19	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
20	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
21	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
22	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
23	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
24	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
25	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
26	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01

27	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
28	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
29	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
30	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
31	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
32	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
33	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
34	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	0.000E+00	1.487E+01
35	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
36	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
37	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
38	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
39	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
40	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
41	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
42	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
43	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
44	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
45	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01

TRANSIENT BEHAVIOR RESULTS MIXER CONCENTRATIONS GIVEN

TIME = 0.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	3.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
2	3.000E-02	4.647E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
3	3.000E-02	3.068E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
4	3.000E-02	1.995E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
5	3.000E-02	1.297E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
6	3.000E-02	8.436E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
7	3.000E-02	5.485E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
8	3.000E-02	3.565E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
9	3.006E-02	2.288E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.981E-01	1.000E+02	2.500E+01
10	3.043E-02	9.943E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.994E-01	1.000E+02	2.500E+01
11	3.116E-02	9.029E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.010E+00	1.003E+02	2.500E+01
12	4.097E-02	2.647E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.035E+00	1.008E+02	2.500E+01
12	PRODUCT STREAM							\ 1.008E+02	
13	2.852E-01	3.963E+01	0.000E+00	0.000E+00	6.918E-02	6.918E-02	1.074E+00	1.417E+01	2.500E+01
14	2.801E-01	5.300E+01	0.000E+00	0.000E+00	6.890E-02	6.890E-02	1.093E+00	1.422E+01	2.500E+01
15	2.780E-01	5.849E+01	0.000E+00	0.000E+00	6.879E-02	6.879E-02	1.101E+00	1.425E+01	2.500E+01
16	2.770E-01	6.093E+01	0.000E+00	0.000E+00	6.874E-02	6.874E-02	1.104E+00	1.426E+01	2.500E+01
17	2.767E-01	6.205E+01	0.000E+00	0.000E+00	6.872E-02	6.872E-02	1.106E+00	1.426E+01	2.500E+01
18	2.767E-01	6.256E+01	0.000E+00	0.000E+00	6.871E-02	6.871E-02	1.106E+00	1.426E+01	2.500E+01
19	2.776E-01	6.275E+01	0.000E+00	0.000E+00	6.870E-02	6.870E-02	1.107E+00	1.426E+01	2.500E+01
20	2.817E-01	6.262E+01	0.000E+00	3.275E-08	6.869E-02	6.869E-02	1.107E+00	1.427E+01	2.500E+01
21	2.984E-01	6.168E+01	2.467E-08	1.847E-04	6.868E-02	6.868E-02	1.106E+00	1.427E+01	2.500E+01
22	3.636E-01	5.782E+01	1.308E-04	5.936E-02	6.837E-02	6.862E-02	1.103E+00	1.428E+01	2.500E+01
23	5.948E-01	4.537E+01	3.335E-02	4.284E-01	6.659E-02	6.838E-02	1.094E+00	1.433E+01	2.500E+01
24	6.301E-01	1.569E+01	1.006E-02	4.516E-01	6.705E-02	6.894E-02	1.053E+00	1.421E+01	2.500E+01
25	6.449E-01	3.895E+00	4.370E-03	4.563E-01	6.725E-02	6.916E-02	1.037E+00	1.417E+01	2.500E+01
26	6.488E-01	8.580E-01	2.197E-03	4.574E-01	6.731E-02	6.922E-02	1.033E+00	1.416E+01	2.500E+01
27	6.497E-01	1.835E-01	1.211E-03	4.577E-01	6.732E-02	6.923E-02	1.032E+00	1.416E+01	2.500E+01
28	6.498E-01	3.897E-02	7.042E-04	4.578E-01	6.732E-02	6.924E-02	1.032E+00	1.415E+01	2.500E+01
29	6.497E-01	8.270E-03	4.199E-04	4.578E-01	6.732E-02	6.924E-02	1.032E+00	1.415E+01	2.500E+01
30	6.492E-01	1.756E-03	2.514E-04	4.578E-01	6.732E-02	6.924E-02	1.032E+00	1.415E+01	2.500E+01
31	6.473E-01	3.734E-04	1.481E-04	4.579E-01	6.733E-02	6.924E-02	1.032E+00	1.415E+01	2.500E+01
32	6.404E-01	7.984E-05	8.374E-05	4.580E-01	6.734E-02	6.926E-02	1.032E+00	1.415E+01	2.500E+01
33	6.152E-01	1.727E-05	4.390E-05	4.584E-01	6.739E-02	6.931E-02	1.031E+00	1.414E+01	2.500E+01
34	5.216E-01	3.759E-06	2.018E-05	4.597E-01	6.759E-02	6.952E-02	1.028E+00	1.410E+01	2.500E+01
34	PRODUCT STREAM							\ 1.410E+01	
35	1.889E+00	2.837E+01	1.902E-01	0.000E+00	0.000E+00	0.000E+00	1.104E+00	1.006E+01	2.500E+01
36	1.823E+00	4.557E+01	3.544E-01	0.000E+00	0.000E+00	0.000E+00	1.127E+00	1.009E+01	2.500E+01
37	1.755E+00	6.323E+01	5.511E-01	0.000E+00	0.000E+00	0.000E+00	1.151E+00	1.013E+01	2.500E+01
38	1.652E+00	9.238E+01	8.971E-01	0.000E+00	0.000E+00	0.000E+00	1.192E+00	1.019E+01	2.500E+01
39	1.419E+00	2.042E+02	2.119E+00	0.000E+00	0.000E+00	1.741E-02	1.365E+00	2.429E+01	2.500E+01
40	1.419E+00	2.042E+02	2.124E+00	0.000E+00	0.000E+00	1.741E-02	1.365E+00	2.429E+01	2.500E+01
41	1.419E+00	2.041E+02	2.142E+00	0.000E+00	0.000E+00	1.741E-02	1.365E+00	2.429E+01	2.500E+01
42	1.419E+00	2.040E+02	2.197E+00	0.000E+00	0.000E+00	1.741E-02	1.365E+00	2.429E+01	2.500E+01
43	1.425E+00	2.024E+02	2.364E+00	0.000E+00	0.000E+00	1.742E-02	1.363E+00	2.429E+01	2.500E+01
44	1.482E+00	1.794E+02	2.663E+00	0.000E+00	0.000E+00	1.751E-02	1.329E+00	2.415E+01	2.500E+01
45	1.442E+00	5.764E+01	1.547E+00	0.000E+00	0.000E+00	1.827E-02	1.136E+00	2.315E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	5.169E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
2	5.169E-04	1.589E-16	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
3	5.169E-04	1.049E-14	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
4	5.169E-04	6.822E-13	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
5	5.169E-04	4.435E-11	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00

6	5.169E-04	2.884E-09	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
7	5.169E-04	1.875E-07	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
8	5.170E-04	1.219E-05	0.000E+00	2.736E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.120E-03
9	5.214E-04	7.924E-04	0.000E+00	2.771E-02	0.000E+00	1.388E-02	8.171E-01	8.001E+01	7.324E-03
10	6.470E-04	5.085E-02	0.000E+00	4.091E-02	0.000E+00	1.701E-02	8.172E-01	8.001E+01	4.983E-03
11	1.487E-03	2.209E+00	0.000E+00	1.953E-01	0.000E+00	3.812E-02	8.201E-01	8.007E+01	2.571E-03
12	3.261E-03	1.998E+01	0.000E+00	6.031E-01	0.000E+00	6.358E-02	8.441E-01	8.056E+01	1.627E-03
13	2.513E-02	5.808E+01	0.000E+00	8.454E+00	0.000E+00	5.082E-01	8.970E-01	8.170E+01	1.045E-03
14	2.157E-02	7.002E+01	0.000E+00	7.620E+00	0.000E+00	4.441E-01	9.135E-01	8.203E+01	1.182E-03
15	2.031E-02	7.409E+01	0.000E+00	7.304E+00	0.000E+00	4.213E-01	9.192E-01	8.214E+01	1.217E-03
16	1.979E-02	7.577E+01	0.000E+00	7.169E+00	0.000E+00	4.118E-01	9.216E-01	8.219E+01	1.119E-03
17	1.956E-02	7.652E+01	0.000E+00	7.109E+00	0.000E+00	4.075E-01	9.226E-01	8.221E+01	9.225E-04
18	1.947E-02	7.687E+01	0.000E+00	7.082E+00	0.000E+00	4.056E-01	9.231E-01	8.222E+01	7.205E-04
19	1.949E-02	7.702E+01	0.000E+00	7.075E+00	0.000E+00	4.047E-01	9.233E-01	8.222E+01	5.316E-04
20	1.979E-02	7.708E+01	0.000E+00	7.095E+00	0.000E+00	4.048E-01	9.234E-01	8.223E+01	3.509E-04
21	2.106E-02	7.704E+01	1.012E-08	7.198E+00	3.157E-04	4.067E-01	9.234E-01	8.223E+01	2.416E-04
22	2.621E-02	7.675E+01	5.707E-05	7.644E+00	5.523E-03	4.151E-01	9.232E-01	8.224E+01	9.652E-04
23	4.625E-02	7.559E+01	1.839E-02	9.563E+00	2.286E-01	4.463E-01	9.222E-01	8.227E+01	1.317E-03
24	7.691E-02	4.259E+01	8.940E-03	2.915E+00	2.080E-02	1.311E-01	8.772E-01	1.527E+01	5.038E-03
25	1.059E-01	1.473E+01	5.398E-03	4.042E+00	1.252E-02	1.754E-01	8.400E-01	1.514E+01	2.597E-03
26	1.183E-01	3.658E+00	3.056E-03	4.543E+00	7.085E-03	1.943E-01	8.254E-01	1.509E+01	6.819E-03
27	1.216E-01	8.058E-01	1.735E-03	4.678E+00	4.026E-03	1.993E-01	8.216E-01	1.508E+01	3.547E-03
28	1.223E-01	1.723E-01	1.015E-03	4.707E+00	2.358E-03	2.004E-01	8.208E-01	1.507E+01	2.771E-03
29	1.224E-01	3.660E-02	6.062E-04	4.712E+00	1.409E-03	2.006E-01	8.206E-01	1.507E+01	3.357E-03
30	1.223E-01	7.764E-03	3.627E-04	4.709E+00	8.431E-04	2.006E-01	8.206E-01	1.507E+01	4.833E-03
31	1.218E-01	1.645E-03	2.129E-04	4.692E+00	4.950E-04	2.004E-01	8.206E-01	1.507E+01	5.655E-03
32	1.200E-01	3.472E-04	1.187E-04	4.631E+00	2.760E-04	1.995E-01	8.205E-01	1.507E+01	1.984E-03
33	1.134E-01	7.147E-05	5.919E-05	4.409E+00	1.376E-04	1.964E-01	8.203E-01	1.507E+01	9.268E-04
34	8.939E-02	1.270E-05	2.216E-05	3.608E+00	5.146E-05	1.830E-01	8.196E-01	1.505E+01	3.912E-04
35	1.369E-01	8.636E+01	2.088E-01	2.039E+01	7.353E+00	4.854E-01	9.409E-01	6.735E+01	0.000E+00
36	1.046E-01	9.535E+01	2.698E-01	1.399E+01	5.090E+00	3.836E-01	9.527E-01	6.748E+01	0.000E+00
37	8.499E-02	1.008E+02	3.229E-01	1.064E+01	3.908E+00	3.230E-01	9.600E-01	6.756E+01	1.725E-05
38	6.515E-02	1.065E+02	3.867E-01	7.649E+00	2.860E+00	2.617E-01	9.676E-01	6.764E+01	0.000E+00
39	3.502E-02	1.159E+02	4.998E-01	1.584E+00	6.580E-01	6.889E-02	9.803E-01	6.779E+01	0.000E+00
40	3.502E-02	1.159E+02	5.010E-01	1.584E+00	6.580E-01	6.889E-02	9.803E-01	6.779E+01	0.000E+00
41	3.502E-02	1.159E+02	5.051E-01	1.584E+00	6.581E-01	6.889E-02	9.803E-01	6.779E+01	1.198E-04
42	3.504E-02	1.159E+02	5.183E-01	1.585E+00	6.584E-01	6.891E-02	9.803E-01	6.779E+01	7.265E-06
43	3.533E-02	1.158E+02	5.611E-01	1.596E+00	6.625E-01	6.922E-02	9.802E-01	6.779E+01	8.643E-06
44	3.944E-02	1.145E+02	6.909E-01	1.791E+00	7.280E-01	7.467E-02	9.787E-01	6.777E+01	2.262E-05
45	7.790E-02	9.629E+01	9.159E-01	4.868E+00	1.725E+00	1.575E-01	9.543E-01	6.745E+01	1.265E-05

TIME = 571.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	3.000E-02	2.528E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
2	3.000E-02	9.493E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
3	3.000E-02	3.473E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
4	3.000E-02	1.269E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
5	3.000E-02	4.641E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
6	3.001E-02	1.695E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
7	3.014E-02	5.993E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.981E-01	1.000E+02	2.500E+01
8	3.068E-02	1.308E+00	1.945E-14	0.000E+00	0.000E+00	0.000E+00	9.998E-01	1.000E+02	2.500E+01
9	3.126E-02	7.781E+00	3.652E-13	0.000E+00	0.000E+00	0.000E+00	1.009E+00	1.002E+02	2.500E+01
10	3.154E-02	1.852E+01	2.707E-12	0.000E+00	0.000E+00	0.000E+00	1.023E+00	1.006E+02	2.500E+01
11	3.293E-02	2.937E+01	1.338E-11	0.000E+00	0.000E+00	0.000E+00	1.038E+00	1.009E+02	2.500E+01
12	5.420E-02	3.818E+01	5.418E-11	0.000E+00	0.000E+00	0.000E+00	1.051E+00	1.013E+02	2.500E+01
12	PRODUCT STREAM							\ 1.013E+02	
13	3.143E-01	2.908E+01	1.275E-10	1.670E-06	6.934E-02	6.934E-02	1.060E+00	1.413E+01	2.500E+01
14	3.532E-01	3.148E+01	5.345E-07	7.108E-03	6.918E-02	6.921E-02	1.065E+00	1.416E+01	2.500E+01
15	4.132E-01	2.926E+01	2.098E-03	2.422E-01	6.811E-02	6.912E-02	1.065E+00	1.418E+01	2.500E+01
16	4.931E-01	2.563E+01	6.336E-02	1.124E+00	6.432E-02	6.902E-02	1.064E+00	1.420E+01	2.500E+01
17	5.899E-01	2.214E+01	2.663E-01	2.046E+00	6.032E-02	6.888E-02	1.064E+00	1.423E+01	2.500E+01
18	7.056E-01	1.898E+01	4.454E-01	2.564E+00	5.796E-02	6.869E-02	1.065E+00	1.427E+01	2.500E+01
19	8.430E-01	1.596E+01	4.893E-01	2.784E+00	5.680E-02	6.845E-02	1.066E+00	1.432E+01	2.500E+01
20	1.002E+00	1.316E+01	4.410E-01	2.854E+00	5.623E-02	6.817E-02	1.067E+00	1.438E+01	2.500E+01
21	1.183E+00	1.073E+01	3.628E-01	2.866E+00	5.584E-02	6.783E-02	1.070E+00	1.445E+01	2.500E+01
22	1.387E+00	8.696E+00	2.881E-01	2.859E+00	5.547E-02	6.743E-02	1.074E+00	1.453E+01	2.500E+01
23	1.617E+00	7.043E+00	2.263E-01	2.842E+00	5.507E-02	6.696E-02	1.080E+00	1.463E+01	2.500E+01
24	1.641E+00	4.613E-01	4.254E-02	2.846E+00	5.515E-02	6.706E-02	1.071E+00	1.461E+01	2.500E+01
25	1.643E+00	2.785E-02	7.375E-03	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
26	1.643E+00	1.673E-03	1.272E-03	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
27	1.643E+00	1.004E-04	2.192E-04	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
28	1.643E+00	6.028E-06	3.779E-05	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
29	1.643E+00	3.621E-07	6.512E-06	2.845E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
30	1.641E+00	2.177E-08	1.120E-06	2.845E+00	5.517E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
31	1.637E+00	1.314E-09	1.892E-07	2.845E+00	5.518E-02	6.708E-02	1.070E+00	1.461E+01	2.500E+01
32	1.618E+00	8.056E-11	2.840E-08	2.846E+00	5.521E-02	6.712E-02	1.069E+00	1.460E+01	2.500E+01
33	1.543E+00	5.246E-12	0.000E+00	2.853E+00	5.535E-02	6.729E-02	1.067E+00	1.456E+01	2.500E+01
34	1.253E+00	4.194E-13	0.000E+00	2.880E+00	5.587E-02	6.792E-02	1.057E+00	1.443E+01	2.500E+01
34	PRODUCT STREAM							\ 1.443E+01	

35	2.032E+00	8.669E+00	2.537E-01	0.000E+00	0.000E+00	0.000E+00	1.080E+00	1.004E+01	2.500E+01
36	2.114E+00	8.678E+00	2.612E-01	0.000E+00	0.000E+00	0.000E+00	1.083E+00	1.007E+01	2.500E+01
37	2.214E+00	8.183E+00	2.441E-01	0.000E+00	0.000E+00	0.000E+00	1.086E+00	1.010E+01	2.500E+01
38	2.337E+00	7.636E+00	2.240E-01	0.000E+00	0.000E+00	0.000E+00	1.090E+00	1.014E+01	2.500E+01
39	2.480E+00	6.988E+00	2.005E-01	0.000E+00	0.000E+00	1.796E-02	1.098E+00	2.355E+01	2.500E+01
40	2.453E+00	1.030E-01	7.879E-03	0.000E+00	0.000E+00	1.802E-02	1.086E+00	2.347E+01	2.500E+01
41	2.351E+00	1.553E-03	3.207E-04	0.000E+00	0.000E+00	1.808E-02	1.082E+00	2.339E+01	2.500E+01
42	2.182E+00	2.584E-05	1.468E-05	0.000E+00	0.000E+00	1.819E-02	1.076E+00	2.326E+01	2.500E+01
43	1.916E+00	5.152E-07	8.278E-07	0.000E+00	0.000E+00	1.835E-02	1.066E+00	2.306E+01	2.500E+01
44	1.516E+00	1.437E-08	6.699E-08	0.000E+00	0.000E+00	1.859E-02	1.052E+00	2.276E+01	2.500E+01
45	9.612E-01	7.254E-10	9.320E-09	0.000E+00	0.000E+00	1.892E-02	1.033E+00	2.236E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	5.169E-04	8.642E-13	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
2	5.169E-04	3.245E-11	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
3	5.169E-04	1.187E-09	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
4	5.169E-04	4.340E-08	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
5	5.169E-04	1.586E-06	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
6	5.174E-04	5.800E-05	0.000E+00	2.738E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.828E-03
7	5.284E-04	2.118E-03	0.000E+00	2.827E-02	0.000E+00	1.403E-02	8.171E-01	8.001E+01	8.045E-03
8	6.918E-04	7.489E-02	3.587E-16	4.578E-02	1.475E-02	1.803E-02	8.172E-01	8.001E+01	5.859E-03
9	1.381E-03	1.635E+00	2.472E-14	1.678E-01	5.406E-02	3.529E-02	8.193E-01	8.005E+01	2.840E-03
10	2.173E-03	9.715E+00	4.578E-13	4.188E-01	1.350E-01	5.501E-02	8.302E-01	8.028E+01	1.390E-03
11	2.641E-03	2.309E+01	3.394E-12	6.284E-01	2.028E-01	6.409E-02	8.482E-01	8.065E+01	7.095E-04
12	4.503E-03	3.657E+01	1.677E-11	7.665E-01	2.477E-01	6.649E-02	8.667E-01	8.103E+01	5.390E-04
13	3.106E-02	4.748E+01	6.770E-11	9.407E+00	2.336E-04	5.693E-01	8.825E-01	8.142E+01	9.300E-04
14	3.398E-02	5.243E+01	2.900E-07	9.592E+00	2.350E-04	5.542E-01	8.894E-01	8.157E+01	2.941E-03
15	4.080E-02	5.284E+01	1.236E-03	1.039E+01	2.912E-02	5.684E-01	8.902E-01	8.160E+01	4.844E-03
16	5.100E-02	5.261E+01	4.253E-02	1.180E+01	2.060E-01	5.946E-01	8.903E-01	8.163E+01	2.905E-03
17	6.391E-02	5.257E+01	2.075E-01	1.363E+01	5.153E-01	6.220E-01	8.909E-01	8.168E+01	2.909E-03
18	7.980E-02	5.254E+01	4.065E-01	1.586E+01	7.738E-01	6.479E-01	8.917E-01	8.173E+01	2.603E-03
19	9.962E-02	5.227E+01	5.315E-01	1.871E+01	9.277E-01	6.752E-01	8.922E-01	8.180E+01	2.147E-03
20	1.237E-01	5.183E+01	5.803E-01	2.242E+01	1.003E+00	7.029E-01	8.924E-01	8.186E+01	3.303E-03
21	1.521E-01	5.134E+01	5.864E-01	2.714E+01	1.030E+00	7.290E-01	8.926E-01	8.194E+01	3.965E-03
22	1.847E-01	5.087E+01	5.771E-01	3.302E+01	1.035E+00	7.516E-01	8.930E-01	8.203E+01	4.374E-03
23	2.217E-01	5.046E+01	5.653E-01	4.021E+01	1.034E+00	7.695E-01	8.936E-01	8.214E+01	3.851E-03
24	3.657E-01	6.759E+00	2.167E-01	1.529E+01	7.829E-02	2.325E-01	8.371E-01	1.525E+01	2.577E-03
25	3.875E-01	4.427E-01	4.075E-02	1.657E+01	1.488E-02	2.458E-01	8.289E-01	1.523E+01	1.724E-03
26	3.890E-01	2.673E-02	7.064E-03	1.665E+01	2.585E-03	2.467E-01	8.283E-01	1.523E+01	2.630E-03
27	3.891E-01	1.605E-03	1.218E-03	1.666E+01	4.460E-04	2.468E-01	8.282E-01	1.523E+01	4.037E-03
28	3.890E-01	9.636E-05	2.100E-04	1.666E+01	7.689E-05	2.468E-01	8.282E-01	1.523E+01	6.564E-03
29	3.890E-01	5.786E-06	3.617E-05	1.665E+01	1.325E-05	2.468E-01	8.282E-01	1.523E+01	7.402E-03
30	3.887E-01	3.475E-07	6.211E-06	1.664E+01	2.275E-06	2.468E-01	8.282E-01	1.523E+01	6.085E-03
31	3.875E-01	2.089E-08	1.045E-06	1.657E+01	3.830E-07	2.467E-01	8.282E-01	1.523E+01	3.669E-03
32	3.827E-01	1.261E-09	1.541E-07	1.632E+01	5.647E-08	2.467E-01	8.281E-01	1.522E+01	1.483E-03
33	3.639E-01	7.694E-11	0.000E+00	1.532E+01	0.000E+00	2.464E-01	8.275E-01	1.521E+01	5.196E-04
34	2.892E-01	4.639E-12	0.000E+00	1.163E+01	0.000E+00	2.426E-01	8.254E-01	1.517E+01	4.810E-04
35	2.408E-01	5.997E+01	6.312E-01	4.617E+01	1.661E+01	7.909E-01	9.076E-01	6.701E+01	0.000E+00
36	2.467E-01	6.122E+01	6.688E-01	4.699E+01	1.706E+01	7.773E-01	9.097E-01	6.706E+01	2.746E-05
37	2.596E-01	6.120E+01	6.697E-01	4.968E+01	1.823E+01	7.789E-01	9.101E-01	6.709E+01	0.000E+00
38	2.756E-01	6.109E+01	6.668E-01	5.297E+01	1.971E+01	7.808E-01	9.104E-01	6.713E+01	0.000E+00
39	2.952E-01	6.097E+01	6.635E-01	2.489E+01	9.440E+00	3.396E-01	9.109E-01	6.718E+01	0.000E+00
40	5.552E-01	2.476E+00	7.103E-02	6.806E+01	2.553E+01	6.410E-01	8.366E-01	6.647E+01	2.933E-05
41	5.437E-01	3.642E-02	2.786E-03	6.654E+01	2.465E+01	6.563E-01	8.328E-01	6.638E+01	0.000E+00
42	5.055E-01	5.482E-04	1.132E-04	6.045E+01	2.196E+01	6.600E-01	8.316E-01	6.628E+01	1.898E-05
43	4.428E-01	9.090E-06	5.162E-06	5.060E+01	1.788E+01	6.628E-01	8.298E-01	6.612E+01	0.000E+00
44	3.444E-01	1.801E-07	2.866E-07	3.628E+01	1.238E+01	6.573E-01	8.269E-01	6.587E+01	0.000E+00
45	1.988E-01	4.744E-09	2.009E-08	1.916E+01	6.317E+00	6.060E-01	8.228E-01	6.550E+01	0.000E+00

A.4 MFRF in Solvent Recycle Diversion Scenario

1CALCULATIONS FOR A SOLVENT EXTRACTION PROCESS HAVING INTERACTING SOLUTES

GENERATED PROFILE
THIS IS A DIVERSION THROUGH THE SOLVENT RECYCLE STREAM
FROM THE FIRST CYCLE IN THE MODEL FUEL RECYCLING FACILITY
THE ORGANIC PHASE FLOWRATE WAS INCREASED TO THE MAXIMUM, AND
AQUEOUS FLOWRATES WERE GREATLY DECREASED IN ORDER TO CREATE
THE DIVERSION.
DTHETA = 1.000 MINUTES PER TIME INCREMENT
DPRINT = 5001.000 MINUTES WETWEEN PRINTING OF PROFILES
IFAST = 0 THE RUNGE-KUTTA INTEGRATION WILL BE USED
THIS TIME PERIOD WILL END WHEN TIME = TSTOP = 1000.000 MINUTES OR A TOLERANCE OF TOL = 0.0100 % PER MINUTE IS REACHED
NUMBER OF STAGES = 45
NEWIN = 1 NEW INPUT FLOWS WILL BE GIVEN
NEWOUT = 1 NEW OUTPUT FLOWS WILL BE GIVEN
NEWOUT = 1 INVALID VALUE
IVOLM = 3 MIXER VOLUMES DETERMINED BY PHASE FLOW
IVOLS = 3 SETTLE VOLUMES GIVEN BY PHASE FLOW
IPRO = 0 A NEW INITIAL PROFILE WILL NOT BE READ
IPNCH = 0 NO PUNCHED CARD OUTPUT
NSTR = 1 ROUTING PATTERN OTHER THAN NORMAL
ORGANIC STREAM EXITING AT STAGE 35 FEEDS STAGE 23
TEMPI = 2.500E+01 INITIAL & DEFAULT TEMPERATURE
IRXN = 3 REDUCTION OF PLUTONIUM BY HYDROXYLAMINE

FEED & PRODUCT STREAM DATA	STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	FLOW RATE (L/MIN)	TEMP (C)
AQUEOUS	1	3.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+02	25.0
AQUEOUS	13	3.000E-01	0.000E+00	0.000E+00	0.000E+00	7.000E-02	7.000E-02	1.400E+01	25.0
30.0 % TBP	34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.500E+01	25.0
AQUEOUS	35	2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+01	25.0
AQUEOUS	39	1.250E+00	2.850E+02	3.000E+00	0.000E+00	0.000E+00	3.000E-02	1.410E+01	25.0
30.0 % TBP	45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.500E+01	25.0
AQUEOUS	12	PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS)						5.000E+03	
AQUEOUS	34	PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS)						5.000E+03	

STAGE NO.	MIXER VOLUME BY PHASE AQUEOUS	MIXER VOLUME BY PHASE ORGANIC	SETTLER VOLUME BY PHASE AQUEOUS	SETTLER VOLUME BY PHASE ORGANIC	MIXER FLOW RATE AQUEOUS	MIXER FLOW RATE ORGANIC	INTERSTAGE FLOW RATE AQUEOUS	INTERSTAGE FLOW RATE ORGANIC
1	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
2	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
3	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
4	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
5	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
6	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
7	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
8	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
9	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
10	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
11	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
12	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	0.000E+00	7.931E+01
13	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
14	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
15	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
16	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
17	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
18	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
19	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
20	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
21	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
22	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
23	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
24	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
25	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
26	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
27	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
28	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
29	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
30	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
31	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
32	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
33	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
34	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	0.000E+00	1.487E+01
35	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
36	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
37	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
38	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01

39	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
40	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
41	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
42	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
43	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
44	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
45	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01

TRANSIENT BEHAVIOR RESULTS MIXER CONCENTRATIONS GIVEN

TIME = 0.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
7	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
8	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
9	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.991E+01	2.500E+01
12	PRODUCT STREAM						\	9.991E+01	
13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
25	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
30	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
31	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
32	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
33	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	1.384E+01	2.500E+01
34	PRODUCT STREAM						\	1.384E+01	
35	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.382E+00	2.500E+01
36	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.382E+00	2.500E+01
37	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.382E+00	2.500E+01
38	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	9.382E+00	2.500E+01
39	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
40	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
41	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
42	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
43	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
44	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01
45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.971E-01	2.168E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
7	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
8	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
9	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02

18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	8.000E+01	2.000E+02
24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
25	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
30	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
31	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
32	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
33	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	1.500E+01	2.000E+02
35	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
36	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
37	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
38	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
39	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
40	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
41	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
42	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
43	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
44	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02
45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.171E-01	6.500E+01	2.000E+02

TIME = 526.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	3.000E-02	2.527E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
2	3.000E-02	9.490E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
3	3.000E-02	3.472E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
4	3.000E-02	1.269E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
5	3.000E-02	4.640E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
6	3.001E-02	1.694E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
7	3.014E-02	5.991E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.981E-01	1.000E+02	2.500E+01
8	3.068E-02	1.308E+00	1.946E-14	0.000E+00	0.000E+00	0.000E+00	9.998E-01	1.000E+02	2.500E+01
9	3.126E-02	7.780E+00	3.655E-13	0.000E+00	0.000E+00	0.000E+00	1.009E+00	1.002E+02	2.500E+01
10	3.154E-02	1.852E+01	2.711E-12	0.000E+00	0.000E+00	0.000E+00	1.023E+00	1.006E+02	2.500E+01
11	3.293E-02	2.936E+01	1.340E-11	0.000E+00	0.000E+00	0.000E+00	1.038E+00	1.009E+02	2.500E+01
12	5.420E-02	3.818E+01	5.425E-11	0.000E+00	0.000E+00	0.000E+00	1.051E+00	1.013E+02	2.500E+01
12	PRODUCT STREAM							\ 1.013E+02	
13	3.143E-01	2.908E+01	1.275E-10	1.670E-06	6.934E-02	6.934E-02	1.060E+00	1.413E+01	2.500E+01
14	3.532E-01	3.148E+01	5.345E-07	7.108E-03	6.918E-02	6.921E-02	1.065E+00	1.416E+01	2.500E+01
15	4.132E-01	2.926E+01	2.098E-03	2.422E-01	6.811E-02	6.912E-02	1.065E+00	1.418E+01	2.500E+01
16	4.931E-01	2.563E+01	6.336E-02	1.124E+00	6.432E-02	6.902E-02	1.064E+00	1.420E+01	2.500E+01
17	5.899E-01	2.214E+01	2.663E-01	2.046E+00	6.032E-02	6.888E-02	1.064E+00	1.423E+01	2.500E+01
18	7.057E-01	1.898E+01	4.454E-01	2.564E+00	5.796E-02	6.869E-02	1.065E+00	1.427E+01	2.500E+01
19	8.430E-01	1.596E+01	4.893E-01	2.784E+00	5.680E-02	6.845E-02	1.066E+00	1.432E+01	2.500E+01
20	1.002E+00	1.316E+01	4.409E-01	2.854E+00	5.623E-02	6.817E-02	1.067E+00	1.438E+01	2.500E+01
21	1.183E+00	1.073E+01	3.628E-01	2.866E+00	5.583E-02	6.783E-02	1.070E+00	1.445E+01	2.500E+01
22	1.387E+00	8.696E+00	2.881E-01	2.859E+00	5.547E-02	6.743E-02	1.074E+00	1.453E+01	2.500E+01
23	1.617E+00	7.043E+00	2.263E-01	2.842E+00	5.507E-02	6.696E-02	1.080E+00	1.463E+01	2.500E+01
24	1.641E+00	4.613E-01	4.254E-02	2.846E+00	5.515E-02	6.706E-02	1.071E+00	1.461E+01	2.500E+01
25	1.643E+00	2.785E-02	7.375E-03	2.847E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
26	1.643E+00	1.672E-03	1.272E-03	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
27	1.643E+00	1.004E-04	2.192E-04	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
28	1.643E+00	6.028E-06	3.779E-05	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
29	1.643E+00	3.620E-07	6.512E-06	2.846E+00	5.516E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
30	1.641E+00	2.177E-08	1.119E-06	2.845E+00	5.517E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
31	1.637E+00	1.314E-09	1.892E-07	2.845E+00	5.518E-02	6.708E-02	1.070E+00	1.461E+01	2.500E+01
32	1.618E+00	8.055E-11	2.840E-08	2.846E+00	5.521E-02	6.712E-02	1.069E+00	1.460E+01	2.500E+01
33	1.543E+00	5.246E-12	0.000E+00	2.853E+00	5.535E-02	6.729E-02	1.067E+00	1.456E+01	2.500E+01
34	1.253E+00	4.194E-13	0.000E+00	2.880E+00	5.587E-02	6.792E-02	1.057E+00	1.443E+01	2.500E+01
34	PRODUCT STREAM							\ 1.443E+01	
35	2.032E+00	8.669E+00	2.537E-01	0.000E+00	0.000E+00	0.000E+00	1.080E+00	1.004E+01	2.500E+01
36	2.114E+00	8.678E+00	2.612E-01	0.000E+00	0.000E+00	0.000E+00	1.083E+00	1.007E+01	2.500E+01
37	2.214E+00	8.184E+00	2.441E-01	0.000E+00	0.000E+00	0.000E+00	1.086E+00	1.010E+01	2.500E+01
38	2.337E+00	7.636E+00	2.240E-01	0.000E+00	0.000E+00	0.000E+00	1.090E+00	1.014E+01	2.500E+01
39	2.480E+00	6.988E+00	2.005E-01	0.000E+00	0.000E+00	1.796E-02	1.098E+00	2.355E+01	2.500E+01
40	2.453E+00	1.030E-01	7.879E-03	0.000E+00	0.000E+00	1.802E-02	1.086E+00	2.347E+01	2.500E+01
41	2.351E+00	1.553E-03	3.207E-04	0.000E+00	0.000E+00	1.808E-02	1.082E+00	2.339E+01	2.500E+01
42	2.182E+00	2.584E-05	1.468E-05	0.000E+00	0.000E+00	1.819E-02	1.076E+00	2.326E+01	2.500E+01
43	1.916E+00	5.152E-07	8.278E-07	0.000E+00	0.000E+00	1.835E-02	1.066E+00	2.306E+01	2.500E+01
44	1.516E+00	1.437E-08	6.699E-08	0.000E+00	0.000E+00	1.859E-02	1.052E+00	2.276E+01	2.500E+01
45	9.612E-01	7.254E-10	9.320E-09	0.000E+00	0.000E+00	1.892E-02	1.033E+00	2.236E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	5.169E-04	8.638E-13	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
2	5.169E-04	3.244E-11	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.590E-07
3	5.169E-04	1.187E-09	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.590E-07
4	5.169E-04	4.339E-08	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	1.214E-06
5	5.169E-04	1.586E-06	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	5.056E-06
6	5.174E-04	5.799E-05	0.000E+00	2.738E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.544E-03
7	5.284E-04	2.117E-03	0.000E+00	2.827E-02	0.000E+00	1.403E-02	8.171E-01	8.001E+01	7.679E-03
8	6.918E-04	7.487E-02	3.589E-16	4.578E-02	1.475E-02	1.803E-02	8.172E-01	8.001E+01	5.409E-03
9	1.381E-03	1.634E+00	2.474E-14	1.678E-01	5.405E-02	3.529E-02	8.193E-01	8.005E+01	2.775E-03
10	2.173E-03	9.714E+00	4.585E-13	4.188E-01	1.350E-01	5.500E-02	8.302E-01	8.028E+01	1.386E-03
11	2.641E-03	2.309E+01	3.401E-12	6.284E-01	2.028E-01	6.409E-02	8.482E-01	8.065E+01	6.180E-04
12	4.503E-03	3.657E+01	1.679E-11	7.665E-01	2.477E-01	6.649E-02	8.667E-01	8.103E+01	4.938E-04
13	3.106E-02	4.748E+01	6.770E-11	9.407E+00	2.336E-04	5.693E-01	8.825E-01	8.142E+01	8.979E-04
14	3.398E-02	5.243E+01	2.900E-07	9.592E+00	2.350E-04	5.542E-01	8.894E-01	8.157E+01	7.245E-03
15	4.080E-02	5.284E+01	1.236E-03	1.039E+01	2.912E-02	5.684E-01	8.902E-01	8.160E+01	3.207E-03
16	5.100E-02	5.261E+01	4.253E-02	1.180E+01	2.060E-01	5.946E-01	8.903E-01	8.163E+01	2.898E-03
17	6.391E-02	5.257E+01	2.075E-01	1.363E+01	5.153E-01	6.220E-01	8.909E-01	8.168E+01	2.887E-03
18	7.981E-02	5.254E+01	4.065E-01	1.586E+01	7.738E-01	6.479E-01	8.917E-01	8.173E+01	2.567E-03
19	9.962E-02	5.227E+01	5.315E-01	1.872E+01	9.277E-01	6.752E-01	8.922E-01	8.180E+01	2.161E-03
20	1.237E-01	5.183E+01	5.803E-01	2.242E+01	1.003E+00	7.029E-01	8.924E-01	8.186E+01	2.890E-03
21	1.521E-01	5.134E+01	5.864E-01	2.714E+01	1.030E+00	7.290E-01	8.926E-01	8.194E+01	3.191E-03
22	1.847E-01	5.087E+01	5.771E-01	3.302E+01	1.035E+00	7.516E-01	8.930E-01	8.203E+01	3.106E-03
23	2.217E-01	5.046E+01	5.653E-01	4.021E+01	1.034E+00	7.695E-01	8.936E-01	8.214E+01	3.821E-03
24	3.657E-01	6.758E+00	2.167E-01	1.529E+01	7.828E-02	2.325E-01	8.371E-01	1.525E+01	3.466E-03
25	3.875E-01	4.427E-01	4.075E-02	1.657E+01	1.488E-02	2.458E-01	8.289E-01	1.523E+01	1.866E-03
26	3.890E-01	2.673E-02	7.064E-03	1.665E+01	2.585E-03	2.467E-01	8.283E-01	1.523E+01	2.513E-03
27	3.891E-01	1.605E-03	1.218E-03	1.666E+01	4.459E-04	2.468E-01	8.282E-01	1.523E+01	3.588E-03
28	3.891E-01	9.636E-05	2.100E-04	1.666E+01	7.687E-05	2.468E-01	8.282E-01	1.523E+01	5.311E-03
29	3.890E-01	5.785E-06	3.617E-05	1.665E+01	1.325E-05	2.468E-01	8.282E-01	1.523E+01	7.476E-03
30	3.887E-01	3.475E-07	6.211E-06	1.664E+01	2.275E-06	2.468E-01	8.282E-01	1.523E+01	7.544E-03
31	3.875E-01	2.089E-08	1.045E-06	1.657E+01	3.829E-07	2.467E-01	8.282E-01	1.523E+01	5.589E-03
32	3.827E-01	1.261E-09	1.541E-07	1.632E+01	5.646E-08	2.467E-01	8.281E-01	1.522E+01	2.936E-03
33	3.639E-01	7.693E-11	0.000E+00	1.532E+01	0.000E+00	2.464E-01	8.275E-01	1.521E+01	8.526E-04
34	2.892E-01	4.639E-12	0.000E+00	1.163E+01	0.000E+00	2.426E-01	8.254E-01	1.517E+01	4.863E-04
35	2.408E-01	5.997E+01	6.312E-01	4.617E+01	1.661E+01	7.909E-01	9.076E-01	6.701E+01	2.247E-05
36	2.467E-01	6.122E+01	6.688E-01	4.699E+01	1.706E+01	7.773E-01	9.097E-01	6.706E+01	8.103E-06
37	2.596E-01	6.120E+01	6.697E-01	4.968E+01	1.823E+01	7.789E-01	9.101E-01	6.709E+01	0.000E+00
38	2.756E-01	6.109E+01	6.668E-01	5.297E+01	1.971E+01	7.808E-01	9.104E-01	6.713E+01	0.000E+00
39	2.952E-01	6.097E+01	6.635E-01	2.489E+01	9.440E+00	3.396E-01	9.109E-01	6.718E+01	0.000E+00
40	5.552E-01	2.476E+00	7.103E-02	6.806E+01	2.553E+01	6.410E-01	8.366E-01	6.647E+01	1.675E-05
41	5.437E-01	3.642E-02	2.786E-03	6.654E+01	2.465E+01	6.563E-01	8.328E-01	6.638E+01	9.190E-06
42	5.055E-01	5.482E-04	1.132E-04	6.045E+01	2.196E+01	6.600E-01	8.316E-01	6.628E+01	0.000E+00
43	4.428E-01	9.090E-06	5.162E-06	5.060E+01	1.788E+01	6.628E-01	8.298E-01	6.612E+01	5.422E-06
44	3.444E-01	1.801E-07	2.866E-07	3.628E+01	1.238E+01	6.573E-01	8.269E-01	6.587E+01	1.447E-05
45	1.988E-01	4.744E-09	2.009E-08	1.916E+01	6.317E+00	6.060E-01	8.228E-01	6.550E+01	9.617E-07

1CALCULATIONS FOR A SOLVENT EXTRACTION PROCESS HAVING INTERACTING SOLUTES

GENERATED PROFILE
THIS IS A DIVERSION THROUGH THE SOLVENT RECYCLE STREAM
FROM THE FIRST CYCLE IN THE MODEL FUEL RECYCLING FACILITY
THE ORGANIC PHASE FLOWRATE WAS INCREASED TO THE MAXIMUM, AND
AQUEOUS FLOWRATES WERE GREATLY DECREASED IN ORDER TO CREATE
THE DIVERSION.
DTHETA = 1.000 MINUTES PER TIME INCREMENT
DPRINT = 5001.000 MINUTES WEIWEEN PRINTING OF PROFILES
IFAST = 0 THE RUNGE-KUTTA INTEGRATION WILL BE USED
THIS TIME PERIOD WILL END WHEN TIME = TSTOP = 1440.000 MINUTES OR A TOLERANCE OF TOL = 0.0100 % PER MINUTE IS REACHED
NUMBER OF STAGES = 45
NEWIN = 1 NEW INPUT FLOWS WILL BE GIVEN
NEWOUT = 1 NEW OUTPUT FLOWS WILL BE GIVEN
NEWOUT = 1 INVALID VALUE
IVOLM = 3 MIXER VOLUMES DETERMINED BY PHASE FLOW
IVOLS = 3 SETTLE VOLUMES GIVEN BY PHASE FLOW
IPRO = 0 A NEW INITIAL PROFILE WILL NOT BE READ
IPNCH = 0 NO PUNCHED CARD OUTPUT
NSIR = 1 ROUTING PATTERN OTHER THAN NORMAL
ORGANIC STREAM EXITING AT STAGE 35 FEEDS STAGE 23
TEMPI = 2.500E+01 INITIAL & DEFAULT TEMPERATURE
IRXN = 3 REDUCTION OF PLUTONIUM BY HYDROXYLAMINE

FEED & PRODUCT STREAM DATA	STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	FLOW RATE (L/MIN)	TEMP (C)
AQUEOUS	1	3.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.000E+00	25.0
AQUEOUS	13	3.000E-01	0.000E+00	0.000E+00	0.000E+00	7.000E-02	7.000E-02	5.000E+00	25.0
30.0 % TBP	34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.950E+01	25.0
AQUEOUS	35	2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+01	25.0
AQUEOUS	39	1.250E+00	2.850E+02	3.000E+00	0.000E+00	0.000E+00	3.000E-02	1.410E+01	25.0
30.0 % TBP	45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.405E+01	25.0

AQUEOUS 12 PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS) 5.000E+03
AQUEOUS 34 PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS) 5.000E+03

STAGE NO.	MIXER VOLUME BY PHASE		SETTLER VOLUME BY PHASE		MIXER FLOW RATE		INTERSTAGE FLOW RATE	
	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC
1	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02
2	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02
3	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02
4	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02
5	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02
6	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02
7	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02
8	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02
9	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02
10	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02
11	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02
12	4.995E+00	1.027E+02	4.995E+00	1.027E+02	4.995E+00	1.027E+02	0.000E+00	1.027E+02
13	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02
14	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02
15	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02
16	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02
17	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02
18	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02
19	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02
20	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02
21	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02
22	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02
23	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02	4.943E+00	1.027E+02
24	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01
25	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01
26	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01
27	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01
28	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01
29	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01
30	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01
31	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01
32	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01
33	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01
34	4.943E+00	1.933E+01	4.943E+00	1.933E+01	4.943E+00	1.933E+01	0.000E+00	1.933E+01
35	9.382E+00	8.333E+01	9.382E+00	8.333E+01	9.382E+00	8.333E+01	9.382E+00	8.333E+01
36	9.382E+00	8.333E+01	9.382E+00	8.333E+01	9.382E+00	8.333E+01	9.382E+00	8.333E+01
37	9.382E+00	8.333E+01	9.382E+00	8.333E+01	9.382E+00	8.333E+01	9.382E+00	8.333E+01
38	9.382E+00	8.333E+01	9.382E+00	8.333E+01	9.382E+00	8.333E+01	9.382E+00	8.333E+01
39	2.168E+01	8.333E+01	2.168E+01	8.333E+01	2.168E+01	8.333E+01	2.168E+01	8.333E+01
40	2.168E+01	8.333E+01	2.168E+01	8.333E+01	2.168E+01	8.333E+01	2.168E+01	8.333E+01
41	2.168E+01	8.333E+01	2.168E+01	8.333E+01	2.168E+01	8.333E+01	2.168E+01	8.333E+01
42	2.168E+01	8.333E+01	2.168E+01	8.333E+01	2.168E+01	8.333E+01	2.168E+01	8.333E+01
43	2.168E+01	8.333E+01	2.168E+01	8.333E+01	2.168E+01	8.333E+01	2.168E+01	8.333E+01
44	2.168E+01	8.333E+01	2.168E+01	8.333E+01	2.168E+01	8.333E+01	2.168E+01	8.333E+01
45	2.168E+01	8.333E+01	2.168E+01	8.333E+01	2.168E+01	8.333E+01	2.168E+01	8.333E+01

TRANSIENT BEHAVIOR RESULTS MIXER CONCENTRATIONS GIVEN

TIME = 0.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	3.000E-02	2.527E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	5.000E+00	2.500E+01
2	3.000E-02	9.490E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	5.000E+00	2.500E+01
3	3.000E-02	3.472E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	5.000E+00	2.500E+01
4	3.000E-02	1.269E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	5.000E+00	2.500E+01
5	3.000E-02	4.640E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	5.000E+00	2.500E+01
6	3.001E-02	1.694E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	5.000E+00	2.500E+01
7	3.014E-02	5.991E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.981E-01	5.000E+00	2.500E+01
8	3.068E-02	1.308E+00	1.946E-14	0.000E+00	0.000E+00	0.000E+00	9.998E-01	5.002E+00	2.500E+01
9	3.126E-02	7.780E+00	3.655E-13	0.000E+00	0.000E+00	0.000E+00	1.009E+00	5.012E+00	2.500E+01
10	3.154E-02	1.852E+01	2.711E-12	0.000E+00	0.000E+00	0.000E+00	1.023E+00	5.029E+00	2.500E+01
11	3.293E-02	2.936E+01	1.340E-11	0.000E+00	0.000E+00	0.000E+00	1.038E+00	5.046E+00	2.500E+01
12	5.420E-02	3.818E+01	5.425E-11	0.000E+00	0.000E+00	0.000E+00	1.051E+00	5.063E+00	2.500E+01
12	PRODUCT STREAM							\ 5.063E+00	
13	3.143E-01	2.908E+01	1.275E-10	1.670E-06	6.934E-02	6.934E-02	1.060E+00	5.047E+00	2.500E+01
14	3.532E-01	3.148E+01	5.345E-07	7.108E-03	6.918E-02	6.921E-02	1.065E+00	5.057E+00	2.500E+01
15	4.132E-01	2.926E+01	2.098E-03	2.422E-01	6.811E-02	6.912E-02	1.065E+00	5.063E+00	2.500E+01
16	4.931E-01	2.563E+01	6.336E-02	1.124E+00	6.432E-02	6.902E-02	1.064E+00	5.071E+00	2.500E+01
17	5.899E-01	2.214E+01	2.663E-01	2.046E+00	6.032E-02	6.888E-02	1.064E+00	5.081E+00	2.500E+01
18	7.057E-01	1.898E+01	4.454E-01	2.564E+00	5.796E-02	6.869E-02	1.065E+00	5.095E+00	2.500E+01
19	8.430E-01	1.596E+01	4.893E-01	2.784E+00	5.680E-02	6.845E-02	1.066E+00	5.113E+00	2.500E+01
20	1.002E+00	1.316E+01	4.409E-01	2.854E+00	5.623E-02	6.817E-02	1.067E+00	5.134E+00	2.500E+01
21	1.183E+00	1.073E+01	3.628E-01	2.866E+00	5.583E-02	6.783E-02	1.070E+00	5.160E+00	2.500E+01

22	1.387E+00	8.696E+00	2.881E-01	2.859E+00	5.547E-02	6.743E-02	1.074E+00	5.191E+00	2.500E+01
23	1.617E+00	7.043E+00	2.263E-01	2.842E+00	5.507E-02	6.696E-02	1.080E+00	5.227E+00	2.500E+01
24	1.641E+00	4.613E-01	4.254E-02	2.846E+00	5.515E-02	6.706E-02	1.071E+00	5.219E+00	2.500E+01
25	1.643E+00	2.785E-02	7.375E-03	2.847E+00	5.516E-02	6.707E-02	1.070E+00	5.219E+00	2.500E+01
26	1.643E+00	1.672E-03	1.272E-03	2.846E+00	5.516E-02	6.707E-02	1.070E+00	5.219E+00	2.500E+01
27	1.643E+00	1.004E-04	2.192E-04	2.846E+00	5.516E-02	6.707E-02	1.070E+00	5.219E+00	2.500E+01
28	1.643E+00	6.028E-06	3.779E-05	2.846E+00	5.516E-02	6.707E-02	1.070E+00	5.219E+00	2.500E+01
29	1.643E+00	3.620E-07	6.512E-06	2.846E+00	5.516E-02	6.707E-02	1.070E+00	5.219E+00	2.500E+01
30	1.641E+00	2.177E-08	1.119E-06	2.845E+00	5.517E-02	6.707E-02	1.070E+00	5.218E+00	2.500E+01
31	1.637E+00	1.314E-09	1.892E-07	2.845E+00	5.518E-02	6.708E-02	1.070E+00	5.218E+00	2.500E+01
32	1.618E+00	8.055E-11	2.840E-08	2.846E+00	5.521E-02	6.712E-02	1.069E+00	5.214E+00	2.500E+01
33	1.543E+00	5.246E-12	0.000E+00	2.853E+00	5.535E-02	6.729E-02	1.067E+00	5.202E+00	2.500E+01
34	1.253E+00	4.194E-13	0.000E+00	2.880E+00	5.587E-02	6.792E-02	1.057E+00	5.153E+00	2.500E+01
34	PRODUCT STREAM						\	5.153E+00	
35	2.032E+00	8.669E+00	2.537E-01	0.000E+00	0.000E+00	0.000E+00	1.080E+00	1.004E+01	2.500E+01
36	2.114E+00	8.678E+00	2.612E-01	0.000E+00	0.000E+00	0.000E+00	1.083E+00	1.007E+01	2.500E+01
37	2.214E+00	8.184E+00	2.441E-01	0.000E+00	0.000E+00	0.000E+00	1.086E+00	1.010E+01	2.500E+01
38	2.337E+00	7.636E+00	2.240E-01	0.000E+00	0.000E+00	0.000E+00	1.090E+00	1.014E+01	2.500E+01
39	2.480E+00	6.988E+00	2.005E-01	0.000E+00	0.000E+00	1.796E-02	1.098E+00	2.355E+01	2.500E+01
40	2.453E+00	1.030E-01	7.879E-03	0.000E+00	0.000E+00	1.802E-02	1.086E+00	2.347E+01	2.500E+01
41	2.351E+00	1.553E-03	3.207E-04	0.000E+00	0.000E+00	1.808E-02	1.082E+00	2.339E+01	2.500E+01
42	2.182E+00	2.584E-05	1.468E-05	0.000E+00	0.000E+00	1.819E-02	1.076E+00	2.326E+01	2.500E+01
43	1.916E+00	5.152E-07	8.278E-07	0.000E+00	0.000E+00	1.835E-02	1.066E+00	2.306E+01	2.500E+01
44	1.516E+00	1.437E-08	6.699E-08	0.000E+00	0.000E+00	1.859E-02	1.052E+00	2.276E+01	2.500E+01
45	9.612E-01	7.254E-10	9.320E-09	0.000E+00	0.000E+00	1.892E-02	1.033E+00	2.236E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	5.169E-04	8.638E-13	0.000E+00	7.080E-01	0.000E+00	3.569E-01	8.171E-01	1.036E+02	0.000E+00
2	5.169E-04	3.244E-11	0.000E+00	7.080E-01	0.000E+00	3.569E-01	8.171E-01	1.036E+02	7.590E-07
3	5.169E-04	1.187E-09	0.000E+00	7.080E-01	0.000E+00	3.569E-01	8.171E-01	1.036E+02	7.590E-07
4	5.169E-04	4.339E-08	0.000E+00	7.080E-01	0.000E+00	3.569E-01	8.171E-01	1.036E+02	1.214E-06
5	5.169E-04	1.586E-06	0.000E+00	7.080E-01	0.000E+00	3.569E-01	8.171E-01	1.036E+02	5.056E-06
6	5.174E-04	5.799E-05	0.000E+00	7.088E-01	0.000E+00	3.571E-01	8.171E-01	1.036E+02	7.544E-03
7	5.284E-04	2.117E-03	0.000E+00	7.320E-01	0.000E+00	3.631E-01	8.171E-01	1.036E+02	7.679E-03
8	6.918E-04	7.487E-02	3.589E-16	1.185E+00	3.817E-01	4.668E-01	8.172E-01	1.036E+02	5.409E-03
9	1.381E-03	1.634E+00	2.474E-14	4.343E+00	1.399E+00	9.136E-01	8.193E-01	1.036E+02	2.775E-03
10	2.173E-03	9.714E+00	4.585E-13	1.084E+01	3.495E+00	1.424E+00	8.302E-01	1.039E+02	1.386E-03
11	2.641E-03	2.309E+01	3.401E-12	1.627E+01	5.249E+00	1.659E+00	8.482E-01	1.044E+02	6.180E-04
12	4.503E-03	3.657E+01	1.679E-11	1.984E+01	6.412E+00	1.721E+00	8.667E-01	1.049E+02	4.938E-04
13	3.106E-02	4.748E+01	6.770E-11	3.409E+01	8.466E-04	2.063E+00	8.825E-01	1.054E+02	8.979E-04
14	3.398E-02	5.243E+01	2.900E-07	3.476E+01	8.516E-04	2.008E+00	8.894E-01	1.056E+02	7.245E-03
15	4.080E-02	5.284E+01	1.236E-03	3.767E+01	1.055E-01	2.060E+00	8.902E-01	1.056E+02	3.207E-03
16	5.100E-02	5.261E+01	4.253E-02	4.277E+01	7.465E-01	2.155E+00	8.903E-01	1.057E+02	2.898E-03
17	6.391E-02	5.257E+01	2.075E-01	4.941E+01	1.867E+00	2.254E+00	8.909E-01	1.057E+02	2.887E-03
18	7.981E-02	5.254E+01	4.065E-01	5.748E+01	2.805E+00	2.348E+00	8.917E-01	1.058E+02	2.567E-03
19	9.962E-02	5.227E+01	5.315E-01	6.783E+01	3.362E+00	2.447E+00	8.922E-01	1.059E+02	2.161E-03
20	1.237E-01	5.183E+01	5.803E-01	8.125E+01	3.634E+00	2.548E+00	8.924E-01	1.060E+02	2.890E-03
21	1.521E-01	5.134E+01	5.864E-01	9.835E+01	3.732E+00	2.642E+00	8.926E-01	1.061E+02	3.191E-03
22	1.847E-01	5.087E+01	5.771E-01	1.197E+02	3.751E+00	2.724E+00	8.930E-01	1.062E+02	3.106E-03
23	2.217E-01	5.046E+01	5.653E-01	1.457E+02	3.747E+00	2.789E+00	8.936E-01	1.063E+02	3.821E-03
24	3.657E-01	6.758E+00	2.167E-01	5.566E+01	2.849E-01	8.465E-01	8.371E-01	1.983E+01	3.466E-03
25	3.875E-01	4.427E-01	4.075E-02	6.030E+01	5.416E-02	8.947E-01	8.289E-01	1.980E+01	1.866E-03
26	3.890E-01	2.673E-02	7.064E-03	6.062E+01	9.410E-03	8.980E-01	8.283E-01	1.980E+01	2.513E-03
27	3.891E-01	1.605E-03	1.218E-03	6.064E+01	1.623E-03	8.982E-01	8.282E-01	1.980E+01	3.588E-03
28	3.891E-01	9.636E-05	2.100E-04	6.064E+01	2.798E-04	8.982E-01	8.282E-01	1.980E+01	5.311E-03
29	3.890E-01	5.785E-06	3.617E-05	6.062E+01	4.822E-05	8.982E-01	8.282E-01	1.980E+01	7.476E-03
30	3.887E-01	3.475E-07	6.211E-06	6.056E+01	8.281E-06	8.982E-01	8.282E-01	1.980E+01	7.544E-03
31	3.875E-01	2.089E-08	1.045E-06	6.032E+01	1.394E-06	8.982E-01	8.282E-01	1.979E+01	5.589E-03
32	3.827E-01	1.261E-09	1.541E-07	5.940E+01	2.055E-07	8.980E-01	8.281E-01	1.979E+01	2.936E-03
33	3.639E-01	7.693E-11	0.000E+00	5.576E+01	0.000E+00	8.968E-01	8.275E-01	1.978E+01	8.526E-04
34	2.892E-01	4.639E-12	0.000E+00	4.233E+01	0.000E+00	8.831E-01	8.254E-01	1.972E+01	4.863E-04
35	2.408E-01	5.997E+01	6.312E-01	5.970E+01	2.148E+01	1.023E+00	9.076E-01	8.665E+01	2.247E-05
36	2.467E-01	6.122E+01	6.688E-01	6.077E+01	2.205E+01	1.005E+00	9.097E-01	8.671E+01	8.103E-06
37	2.596E-01	6.120E+01	6.697E-01	6.424E+01	2.357E+01	1.007E+00	9.101E-01	8.676E+01	0.000E+00
38	2.756E-01	6.109E+01	6.668E-01	6.850E+01	2.548E+01	1.010E+00	9.104E-01	8.681E+01	0.000E+00
39	2.952E-01	6.097E+01	6.635E-01	3.218E+01	1.221E+01	4.391E-01	9.109E-01	8.687E+01	0.000E+00
40	5.552E-01	2.476E+00	7.103E-02	8.801E+01	3.301E+01	8.288E-01	8.366E-01	8.596E+01	1.675E-05
41	5.437E-01	3.642E-02	2.786E-03	8.605E+01	3.188E+01	8.487E-01	8.328E-01	8.584E+01	9.190E-06
42	5.055E-01	5.482E-04	1.132E-04	7.816E+01	2.840E+01	8.535E-01	8.316E-01	8.571E+01	0.000E+00
43	4.428E-01	9.090E-06	5.162E-06	6.543E+01	2.312E+01	8.571E-01	8.298E-01	8.550E+01	5.422E-06
44	3.444E-01	1.801E-07	2.866E-07	4.691E+01	1.601E+01	8.499E-01	8.269E-01	8.518E+01	1.447E-05
45	1.988E-01	4.744E-09	2.009E-08	2.478E+01	8.168E+00	7.836E-01	8.228E-01	8.470E+01	9.617E-07

TIME = 1440.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	1.134E+00	7.757E+00	2.206E-01	0.000E+00	0.000E+00	0.000E+00	1.046E+00	5.190E+00	2.500E+01
2	1.437E+00	5.710E+00	1.625E-01	0.000E+00	0.000E+00	0.000E+00	1.054E+00	5.237E+00	2.500E+01

3	1.520E+00	5.247E+00	1.476E-01	0.000E+00	0.000E+00	0.000E+00	1.056E+00	5.251E+00	2.500E+01
4	1.543E+00	5.128E+00	1.438E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	5.255E+00	2.500E+01
5	1.550E+00	5.095E+00	1.428E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	5.256E+00	2.500E+01
6	1.552E+00	5.086E+00	1.425E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	5.256E+00	2.500E+01
7	1.552E+00	5.083E+00	1.424E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	5.256E+00	2.500E+01
8	1.553E+00	5.083E+00	1.424E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	5.256E+00	2.500E+01
9	1.553E+00	5.083E+00	1.424E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	5.256E+00	2.500E+01
10	1.553E+00	5.083E+00	1.424E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	5.256E+00	2.500E+01
11	1.553E+00	5.083E+00	1.424E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	5.256E+00	2.500E+01
12	1.553E+00	5.083E+00	1.423E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	5.256E+00	2.500E+01
12	PRODUCT STREAM							\ 5.256E+00	
13	1.513E+00	4.765E+00	1.330E-01	4.644E-01	6.530E-02	6.724E-02	1.069E+00	5.205E+00	2.500E+01
14	1.851E+00	3.670E+00	1.067E-01	5.141E-01	6.438E-02	6.653E-02	1.080E+00	5.261E+00	2.500E+01
15	1.948E+00	3.417E+00	9.899E-02	5.428E-01	6.405E-02	6.632E-02	1.083E+00	5.277E+00	2.500E+01
16	1.977E+00	3.349E+00	9.715E-02	5.634E-01	6.391E-02	6.626E-02	1.084E+00	5.282E+00	2.500E+01
17	1.986E+00	3.329E+00	9.673E-02	5.870E-01	6.379E-02	6.624E-02	1.084E+00	5.283E+00	2.500E+01
18	1.988E+00	3.323E+00	9.676E-02	6.070E-01	6.370E-02	6.624E-02	1.084E+00	5.284E+00	2.500E+01
19	1.989E+00	3.321E+00	9.692E-02	6.289E-01	6.361E-02	6.624E-02	1.084E+00	5.284E+00	2.500E+01
20	1.989E+00	3.321E+00	9.713E-02	6.454E-01	6.354E-02	6.624E-02	1.084E+00	5.284E+00	2.500E+01
21	1.989E+00	3.320E+00	9.735E-02	6.630E-01	6.346E-02	6.624E-02	1.084E+00	5.284E+00	2.500E+01
22	1.989E+00	3.320E+00	9.757E-02	6.822E-01	6.338E-02	6.624E-02	1.085E+00	5.284E+00	2.500E+01
23	1.989E+00	3.320E+00	9.779E-02	7.016E-01	6.330E-02	6.624E-02	1.085E+00	5.284E+00	2.500E+01
24	1.898E+00	4.780E-02	3.956E-03	7.046E-01	6.356E-02	6.651E-02	1.076E+00	5.262E+00	2.500E+01
25	1.778E+00	7.436E-04	1.751E-04	7.064E-01	6.382E-02	6.677E-02	1.072E+00	5.242E+00	2.500E+01
26	1.643E+00	1.288E-05	8.719E-06	7.081E-01	6.411E-02	6.707E-02	1.067E+00	5.219E+00	2.500E+01
27	1.495E+00	2.541E-07	4.742E-07	7.107E-01	6.442E-02	6.739E-02	1.062E+00	5.194E+00	2.500E+01
28	1.338E+00	5.830E-09	0.000E+00	7.144E-01	6.474E-02	6.773E-02	1.056E+00	5.167E+00	2.500E+01
29	1.176E+00	1.593E-10	0.000E+00	7.186E-01	6.508E-02	6.809E-02	1.050E+00	5.140E+00	2.500E+01
30	1.012E+00	5.302E-12	0.000E+00	7.230E-01	6.542E-02	6.845E-02	1.045E+00	5.113E+00	2.500E+01
31	8.488E-01	2.203E-13	0.000E+00	7.273E-01	6.576E-02	6.880E-02	1.039E+00	5.087E+00	2.500E+01
32	6.879E-01	1.130E-14	0.000E+00	7.316E-01	6.609E-02	6.915E-02	1.034E+00	5.061E+00	2.500E+01
33	5.244E-01	0.000E+00	0.000E+00	7.361E-01	6.643E-02	6.951E-02	1.028E+00	5.035E+00	2.500E+01
34	3.414E-01	0.000E+00	0.000E+00	7.411E-01	6.681E-02	6.991E-02	1.022E+00	5.006E+00	2.500E+01
34	PRODUCT STREAM							\ 5.006E+00	
35	2.063E+00	4.939E+00	1.446E-01	0.000E+00	0.000E+00	0.000E+00	1.076E+00	1.004E+01	2.500E+01
36	2.128E+00	4.847E+00	1.439E-01	0.000E+00	0.000E+00	0.000E+00	1.078E+00	1.006E+01	2.500E+01
37	2.180E+00	4.692E+00	1.386E-01	0.000E+00	0.000E+00	0.000E+00	1.079E+00	1.008E+01	2.500E+01
38	2.220E+00	4.576E+00	1.344E-01	0.000E+00	0.000E+00	0.000E+00	1.081E+00	1.009E+01	2.500E+01
39	2.241E+00	4.436E+00	1.297E-01	0.000E+00	0.000E+00	1.812E-02	1.085E+00	2.334E+01	2.500E+01
40	2.050E+00	6.317E-02	5.155E-03	0.000E+00	0.000E+00	1.826E-02	1.071E+00	2.316E+01	2.500E+01
41	1.798E+00	1.064E-03	2.484E-04	0.000E+00	0.000E+00	1.842E-02	1.062E+00	2.297E+01	2.500E+01
42	1.512E+00	2.300E-05	1.573E-05	0.000E+00	0.000E+00	1.859E-02	1.052E+00	2.275E+01	2.500E+01
43	1.201E+00	6.895E-07	1.409E-06	0.000E+00	0.000E+00	1.878E-02	1.041E+00	2.253E+01	2.500E+01
44	8.800E-01	3.156E-08	1.915E-07	0.000E+00	0.000E+00	1.897E-02	1.030E+00	2.230E+01	2.500E+01
45	5.475E-01	2.518E-09	4.044E-08	0.000E+00	0.000E+00	1.917E-02	1.019E+00	2.207E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	1.639E-01	3.758E+01	3.566E-01	9.855E+01	3.288E+01	2.939E+00	8.735E-01	1.056E+02	5.228E-03
2	2.177E-01	3.788E+01	3.665E-01	1.340E+02	4.558E+01	3.062E+00	8.756E-01	1.058E+02	8.608E-03
3	2.331E-01	3.776E+01	3.635E-01	1.451E+02	4.965E+01	3.092E+00	8.759E-01	1.059E+02	7.347E-03
4	2.374E-01	3.773E+01	3.627E-01	1.483E+02	5.082E+01	3.099E+00	8.760E-01	1.059E+02	2.530E-03
5	2.386E-01	3.772E+01	3.625E-01	1.492E+02	5.116E+01	3.101E+00	8.761E-01	1.059E+02	1.970E-03
6	2.389E-01	3.772E+01	3.624E-01	1.494E+02	5.125E+01	3.102E+00	8.761E-01	1.059E+02	1.462E-03
7	2.390E-01	3.772E+01	3.624E-01	1.495E+02	5.128E+01	3.102E+00	8.761E-01	1.059E+02	4.709E-03
8	2.390E-01	3.772E+01	3.625E-01	1.495E+02	5.129E+01	3.102E+00	8.761E-01	1.059E+02	9.495E-03
9	2.390E-01	3.772E+01	3.625E-01	1.495E+02	5.129E+01	3.102E+00	8.761E-01	1.059E+02	2.421E-03
10	2.390E-01	3.772E+01	3.625E-01	1.495E+02	5.129E+01	3.102E+00	8.761E-01	1.059E+02	1.321E-02
11	2.390E-01	3.772E+01	3.624E-01	1.495E+02	5.129E+01	3.102E+00	8.761E-01	1.059E+02	1.686E-02
12	2.390E-01	3.772E+01	3.622E-01	1.495E+02	5.129E+01	3.102E+00	8.761E-01	1.059E+02	2.715E-02
13	2.390E-01	3.772E+01	3.619E-01	1.611E+02	1.233E+01	3.214E+00	8.761E-01	1.059E+02	4.321E-01
14	2.986E-01	3.801E+01	3.916E-01	2.090E+02	1.273E+01	3.256E+00	8.784E-01	1.062E+02	1.499E-01
15	3.160E-01	3.795E+01	3.932E-01	2.236E+02	1.233E+01	3.264E+00	8.788E-01	1.062E+02	5.578E-02
16	3.210E-01	3.794E+01	3.948E-01	2.279E+02	1.202E+01	3.266E+00	8.790E-01	1.063E+02	3.892E-01
17	3.225E-01	3.794E+01	3.958E-01	2.292E+02	1.164E+01	3.267E+00	8.790E-01	1.063E+02	5.545E-02
18	3.230E-01	3.795E+01	3.968E-01	2.296E+02	1.134E+01	3.267E+00	8.791E-01	1.063E+02	1.910E-01
19	3.231E-01	3.795E+01	3.978E-01	2.298E+02	1.102E+01	3.267E+00	8.791E-01	1.063E+02	1.074E-01
20	3.232E-01	3.796E+01	3.988E-01	2.299E+02	1.080E+01	3.267E+00	8.791E-01	1.063E+02	1.320E-01
21	3.232E-01	3.796E+01	3.998E-01	2.299E+02	1.058E+01	3.267E+00	8.791E-01	1.063E+02	7.404E-03
22	3.232E-01	3.797E+01	4.009E-01	2.300E+02	1.034E+01	3.267E+00	8.791E-01	1.063E+02	1.411E-03
23	3.232E-01	3.797E+01	4.019E-01	2.300E+02	1.011E+01	3.267E+00	8.791E-01	1.063E+02	1.083E-03
24	4.436E-01	8.840E-01	2.596E-02	6.974E+01	1.382E-01	8.813E-01	8.311E-01	1.984E+01	3.774E-02
25	4.177E-01	1.269E-02	1.049E-03	6.454E+01	5.612E-03	8.884E-01	8.291E-01	1.982E+01	7.172E-02
26	3.845E-01	1.969E-04	4.619E-05	5.797E+01	2.474E-04	8.875E-01	8.281E-01	1.979E+01	5.219E-02
27	3.473E-01	3.402E-06	2.174E-06	5.096E+01	1.164E-05	8.839E-01	8.270E-01	1.976E+01	7.422E-03
28	3.070E-01	6.687E-08	0.000E+00	4.380E+01	0.000E+00	8.759E-01	8.259E-01	1.973E+01	2.115E-02
29	2.643E-01	1.529E-09	0.000E+00	3.679E+01	0.000E+00	8.614E-01	8.246E-01	1.970E+01	2.834E-02
30	2.204E-01	4.162E-11	0.000E+00	3.020E+01	0.000E+00	8.379E-01	8.234E-01	1.967E+01	2.718E-02
31	1.764E-01	1.378E-12	0.000E+00	2.414E+01	0.000E+00	8.020E-01	8.221E-01	1.963E+01	2.582E-02
32	1.331E-01	5.425E-14	0.000E+00	1.860E+01	0.000E+00	7.492E-01	8.209E-01	1.960E+01	2.791E-02

33	9.058E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.713E-01	8.197E-01	1.957E+01	3.327E-02
34	4.768E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.450E-01	8.185E-01	1.954E+01	3.764E-02
35	2.956E-01	4.650E+01	4.895E-01	8.105E+01	2.915E+01	1.234E+00	8.903E-01	8.642E+01	3.459E-04
36	3.036E-01	4.705E+01	5.060E-01	8.344E+01	3.022E+01	1.226E+00	8.913E-01	8.647E+01	3.418E-04
37	3.116E-01	4.702E+01	5.058E-01	8.603E+01	3.133E+01	1.227E+00	8.916E-01	8.649E+01	3.274E-04
38	3.179E-01	4.700E+01	5.051E-01	8.807E+01	3.222E+01	1.228E+00	8.917E-01	8.651E+01	6.985E-06
39	3.229E-01	4.697E+01	5.045E-01	3.925E+01	1.442E+01	5.342E-01	8.918E-01	8.653E+01	1.987E-05
40	4.698E-01	1.209E+00	3.535E-02	7.078E+01	2.536E+01	8.474E-01	8.323E-01	8.563E+01	4.517E-04
41	4.144E-01	1.713E-02	1.398E-03	5.985E+01	2.092E+01	8.567E-01	8.290E-01	8.541E+01	0.000E+00
42	3.432E-01	2.870E-04	6.698E-05	4.670E+01	1.593E+01	8.497E-01	8.269E-01	8.517E+01	0.000E+00
43	2.628E-01	6.163E-06	4.206E-06	3.369E+01	1.125E+01	8.248E-01	8.246E-01	8.491E+01	0.000E+00
44	1.769E-01	1.829E-07	3.645E-07	2.199E+01	7.223E+00	7.631E-01	8.221E-01	8.463E+01	0.000E+00
45	8.942E-02	7.685E-09	4.006E-08	1.167E+01	3.787E+00	6.243E-01	8.196E-01	8.434E+01	0.000E+00

1CALCULATIONS FOR A SOLVENT EXTRACTION PROCESS HAVING INTERACTING SOLUTES

GENERATED PROFILE
THIS IS A DIVERSION THROUGH THE SOLVENT RECYCLE STREAM
FROM THE FIRST CYCLE IN THE MODEL FUEL RECYCLING FACILITY
THE ORGANIC PHASE FLOWRATE WAS INCREASED TO THE MAXIMUM, AND
AQUEOUS FLOWRATES WERE GREATLY DECREASED IN ORDER TO CREATE
THE DIVERSION.
DELTA = 1.000 MINUTES PER TIME INCREMENT
DPRINT = 5001.000 MINUTES BETWEEN PRINTING OF PROFILES
IFAST = 0 THE RUNGE-KUTTA INTEGRATION WILL BE USED
THIS TIME PERIOD WILL END WHEN TIME = TSTOP = 5000.000 MINUTES OR A TOLERANCE OF TOL = 0.0100 % PER MINUTE IS REACHED
NUMBER OF STAGES = 45
NEWIN = 1 NEW INPUT FLOWS WILL BE GIVEN
NEWOUT = 1 NEW OUTPUT FLOWS WILL BE GIVEN
NEWOUT = 1 INVALID VALUE
IVOLM = 3 MIXER VOLUMES DETERMINED BY PHASE FLOW
IVOLS = 3 SETTLE VOLUMES GIVEN BY PHASE FLOW
IPRO = 0 A NEW INITIAL PROFILE WILL NOT BE READ
IPNCH = 0 NO PUNCHED CARD OUTPUT
NSTR = 1 ROUTING PATTERN OTHER THAN NORMAL
ORGANIC STREAM EXITING AT STAGE 35 FEEDS STAGE 23
TEMPI = 2.500E+01 INITIAL & DEFAULT TEMPERATURE
IRXN = 3 REDUCTION OF PLUTONIUM BY HYDROXYLAMINE

FEED & PRODUCT STREAM DATA	STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	FLOW RATE (L/MIN)	TEMP (C)
AQUEOUS	1	3.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+02	25.0
AQUEOUS	13	3.000E-01	0.000E+00	0.000E+00	0.000E+00	7.000E-02	7.000E-02	1.400E+01	25.0
30.0 % TBP	34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.500E+01	25.0
AQUEOUS	35	2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+01	25.0
AQUEOUS	39	1.250E+00	2.850E+02	3.000E+00	0.000E+00	0.000E+00	3.000E-02	1.410E+01	25.0
30.0 % TBP	45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.500E+01	25.0
AQUEOUS	12	PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS)						5.000E+03	
AQUEOUS	34	PRODUCT STREAM REMOVED (FLOW RATE IN MOLAL UNITS)						5.000E+03	

STAGE NO.	MIXER VOLUME BY PHASE		SETTLER VOLUME BY PHASE		MIXER FLOW RATE		INTERSTAGE FLOW RATE	
	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC	AQUEOUS	ORGANIC
1	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
2	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
3	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
4	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
5	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
6	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
7	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
8	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
9	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
10	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
11	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01
12	9.991E+01	7.931E+01	9.991E+01	7.931E+01	9.991E+01	7.931E+01	0.000E+00	7.931E+01
13	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
14	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
15	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
16	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
17	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
18	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
19	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
20	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
21	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
22	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
23	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01	1.384E+01	7.931E+01
24	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
25	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
26	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
27	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01

28	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
29	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
30	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
31	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
32	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
33	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01
34	1.384E+01	1.487E+01	1.384E+01	1.487E+01	1.384E+01	1.487E+01	0.000E+00	1.487E+01
35	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
36	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
37	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
38	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01	9.382E+00	6.444E+01
39	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
40	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
41	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
42	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
43	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
44	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01
45	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01	2.168E+01	6.444E+01

TRANSIENT BEHAVIOR RESULTS MIXER CONCENTRATIONS GIVEN

TIME = 0.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	1.134E+00	7.757E+00	2.206E-01	0.000E+00	0.000E+00	0.000E+00	1.046E+00	1.038E+02	2.500E+01
2	1.437E+00	5.710E+00	1.625E-01	0.000E+00	0.000E+00	0.000E+00	1.054E+00	1.047E+02	2.500E+01
3	1.520E+00	5.247E+00	1.476E-01	0.000E+00	0.000E+00	0.000E+00	1.056E+00	1.050E+02	2.500E+01
4	1.543E+00	5.128E+00	1.438E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	1.051E+02	2.500E+01
5	1.550E+00	5.095E+00	1.428E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	1.051E+02	2.500E+01
6	1.552E+00	5.086E+00	1.425E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	1.051E+02	2.500E+01
7	1.552E+00	5.083E+00	1.424E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	1.051E+02	2.500E+01
8	1.553E+00	5.083E+00	1.424E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	1.051E+02	2.500E+01
9	1.553E+00	5.083E+00	1.424E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	1.051E+02	2.500E+01
10	1.553E+00	5.083E+00	1.424E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	1.051E+02	2.500E+01
11	1.553E+00	5.083E+00	1.424E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	1.051E+02	2.500E+01
12	1.553E+00	5.083E+00	1.423E-01	0.000E+00	0.000E+00	0.000E+00	1.057E+00	1.051E+02	2.500E+01
12	PRODUCT STREAM							\ 1.051E+02	
13	1.513E+00	4.765E+00	1.330E-01	4.644E-01	6.530E-02	6.724E-02	1.069E+00	1.457E+01	2.500E+01
14	1.851E+00	3.670E+00	1.067E-01	5.141E-01	6.438E-02	6.653E-02	1.080E+00	1.473E+01	2.500E+01
15	1.948E+00	3.417E+00	9.899E-02	5.428E-01	6.405E-02	6.632E-02	1.083E+00	1.478E+01	2.500E+01
16	1.977E+00	3.349E+00	9.715E-02	5.634E-01	6.391E-02	6.626E-02	1.084E+00	1.479E+01	2.500E+01
17	1.986E+00	3.329E+00	9.673E-02	5.870E-01	6.379E-02	6.624E-02	1.084E+00	1.479E+01	2.500E+01
18	1.988E+00	3.323E+00	9.676E-02	6.070E-01	6.370E-02	6.624E-02	1.084E+00	1.479E+01	2.500E+01
19	1.989E+00	3.321E+00	9.692E-02	6.289E-01	6.361E-02	6.624E-02	1.084E+00	1.480E+01	2.500E+01
20	1.989E+00	3.321E+00	9.713E-02	6.454E-01	6.354E-02	6.624E-02	1.084E+00	1.480E+01	2.500E+01
21	1.989E+00	3.320E+00	9.735E-02	6.630E-01	6.346E-02	6.624E-02	1.084E+00	1.480E+01	2.500E+01
22	1.989E+00	3.320E+00	9.757E-02	6.822E-01	6.338E-02	6.624E-02	1.085E+00	1.480E+01	2.500E+01
23	1.989E+00	3.320E+00	9.779E-02	7.016E-01	6.330E-02	6.624E-02	1.085E+00	1.480E+01	2.500E+01
24	1.898E+00	4.780E-02	3.956E-03	7.046E-01	6.356E-02	6.651E-02	1.076E+00	1.473E+01	2.500E+01
25	1.778E+00	7.436E-04	1.751E-04	7.064E-01	6.382E-02	6.677E-02	1.072E+00	1.468E+01	2.500E+01
26	1.643E+00	1.288E-05	8.719E-06	7.081E-01	6.411E-02	6.707E-02	1.067E+00	1.461E+01	2.500E+01
27	1.495E+00	2.541E-07	4.742E-07	7.107E-01	6.442E-02	6.739E-02	1.062E+00	1.454E+01	2.500E+01
28	1.338E+00	5.830E-09	0.000E+00	7.144E-01	6.474E-02	6.773E-02	1.056E+00	1.447E+01	2.500E+01
29	1.176E+00	1.593E-10	0.000E+00	7.186E-01	6.508E-02	6.809E-02	1.050E+00	1.439E+01	2.500E+01
30	1.012E+00	5.302E-12	0.000E+00	7.230E-01	6.542E-02	6.845E-02	1.045E+00	1.432E+01	2.500E+01
31	8.488E-01	2.203E-13	0.000E+00	7.273E-01	6.576E-02	6.880E-02	1.039E+00	1.424E+01	2.500E+01
32	6.879E-01	1.130E-14	0.000E+00	7.316E-01	6.609E-02	6.915E-02	1.034E+00	1.417E+01	2.500E+01
33	5.244E-01	0.000E+00	0.000E+00	7.361E-01	6.643E-02	6.951E-02	1.028E+00	1.410E+01	2.500E+01
34	3.414E-01	0.000E+00	0.000E+00	7.411E-01	6.681E-02	6.991E-02	1.022E+00	1.402E+01	2.500E+01
34	PRODUCT STREAM							\ 1.402E+01	
35	2.063E+00	4.939E+00	1.446E-01	0.000E+00	0.000E+00	0.000E+00	1.076E+00	1.004E+01	2.500E+01
36	2.128E+00	4.847E+00	1.439E-01	0.000E+00	0.000E+00	0.000E+00	1.078E+00	1.006E+01	2.500E+01
37	2.180E+00	4.692E+00	1.386E-01	0.000E+00	0.000E+00	0.000E+00	1.079E+00	1.008E+01	2.500E+01
38	2.220E+00	4.576E+00	1.344E-01	0.000E+00	0.000E+00	0.000E+00	1.081E+00	1.009E+01	2.500E+01
39	2.241E+00	4.436E+00	1.297E-01	0.000E+00	0.000E+00	1.812E-02	1.085E+00	2.334E+01	2.500E+01
40	2.050E+00	6.317E-02	5.155E-03	0.000E+00	0.000E+00	1.826E-02	1.071E+00	2.316E+01	2.500E+01
41	1.798E+00	1.064E-03	2.484E-04	0.000E+00	0.000E+00	1.842E-02	1.062E+00	2.297E+01	2.500E+01
42	1.512E+00	2.300E-05	1.573E-05	0.000E+00	0.000E+00	1.859E-02	1.052E+00	2.275E+01	2.500E+01
43	1.201E+00	6.895E-07	1.409E-06	0.000E+00	0.000E+00	1.878E-02	1.041E+00	2.253E+01	2.500E+01
44	8.800E-01	3.156E-08	1.915E-07	0.000E+00	0.000E+00	1.897E-02	1.030E+00	2.230E+01	2.500E+01
45	5.475E-01	2.518E-09	4.044E-08	0.000E+00	0.000E+00	1.917E-02	1.019E+00	2.207E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	1.639E-01	3.758E+01	3.566E-01	3.807E+00	1.270E+00	1.135E-01	8.735E-01	8.158E+01	5.228E-03
2	2.177E-01	3.788E+01	3.665E-01	5.178E+00	1.761E+00	1.183E-01	8.756E-01	8.176E+01	8.608E-03
3	2.331E-01	3.776E+01	3.635E-01	5.606E+00	1.918E+00	1.194E-01	8.759E-01	8.180E+01	7.347E-03
4	2.374E-01	3.773E+01	3.627E-01	5.728E+00	1.963E+00	1.197E-01	8.760E-01	8.181E+01	2.530E-03
5	2.386E-01	3.772E+01	3.625E-01	5.763E+00	1.976E+00	1.198E-01	8.761E-01	8.182E+01	1.970E-03
6	2.389E-01	3.772E+01	3.624E-01	5.773E+00	1.980E+00	1.198E-01	8.761E-01	8.182E+01	1.462E-03

7	2.390E-01	3.772E+01	3.624E-01	5.775E+00	1.981E+00	1.198E-01	8.761E-01	8.182E+01	4.709E-03
8	2.390E-01	3.772E+01	3.625E-01	5.776E+00	1.981E+00	1.198E-01	8.761E-01	8.182E+01	9.495E-03
9	2.390E-01	3.772E+01	3.625E-01	5.776E+00	1.981E+00	1.198E-01	8.761E-01	8.182E+01	2.421E-03
10	2.390E-01	3.772E+01	3.625E-01	5.776E+00	1.981E+00	1.198E-01	8.761E-01	8.182E+01	1.321E-02
11	2.390E-01	3.772E+01	3.624E-01	5.776E+00	1.981E+00	1.198E-01	8.761E-01	8.182E+01	1.686E-02
12	2.390E-01	3.772E+01	3.622E-01	5.776E+00	1.981E+00	1.198E-01	8.761E-01	8.182E+01	2.715E-02
13	2.390E-01	3.772E+01	3.619E-01	4.444E+01	3.401E+00	8.869E-01	8.761E-01	8.182E+01	4.321E-01
14	2.986E-01	3.801E+01	3.916E-01	5.766E+01	3.512E+00	8.983E-01	8.784E-01	8.202E+01	1.499E-01
15	3.160E-01	3.795E+01	3.932E-01	6.169E+01	3.403E+00	9.007E-01	8.788E-01	8.207E+01	5.578E-02
16	3.210E-01	3.794E+01	3.948E-01	6.288E+01	3.318E+00	9.013E-01	8.790E-01	8.209E+01	3.892E-01
17	3.225E-01	3.794E+01	3.958E-01	6.324E+01	3.213E+00	9.014E-01	8.790E-01	8.210E+01	5.545E-02
18	3.230E-01	3.795E+01	3.968E-01	6.336E+01	3.129E+00	9.015E-01	8.791E-01	8.210E+01	1.910E-01
19	3.231E-01	3.795E+01	3.978E-01	6.341E+01	3.041E+00	9.015E-01	8.791E-01	8.210E+01	1.074E-01
20	3.232E-01	3.796E+01	3.988E-01	6.343E+01	2.980E+00	9.015E-01	8.791E-01	8.210E+01	1.320E-01
21	3.232E-01	3.796E+01	3.998E-01	6.344E+01	2.918E+00	9.015E-01	8.791E-01	8.210E+01	7.404E-03
22	3.232E-01	3.797E+01	4.009E-01	6.346E+01	2.852E+00	9.015E-01	8.791E-01	8.210E+01	1.411E-03
23	3.232E-01	3.797E+01	4.019E-01	6.347E+01	2.789E+00	9.016E-01	8.791E-01	8.210E+01	1.083E-03
24	4.436E-01	8.840E-01	2.596E-02	1.916E+01	3.796E-02	2.421E-01	8.311E-01	1.526E+01	3.774E-02
25	4.177E-01	1.269E-02	1.049E-03	1.773E+01	1.542E-03	2.441E-01	8.291E-01	1.524E+01	7.172E-02
26	3.845E-01	1.969E-04	4.619E-05	1.593E+01	6.796E-05	2.438E-01	8.281E-01	1.522E+01	5.219E-02
27	3.473E-01	3.402E-06	2.174E-06	1.400E+01	3.198E-06	2.428E-01	8.270E-01	1.520E+01	7.422E-03
28	3.070E-01	6.687E-08	0.000E+00	1.203E+01	0.000E+00	2.406E-01	8.259E-01	1.518E+01	2.115E-02
29	2.643E-01	1.529E-09	0.000E+00	1.011E+01	0.000E+00	2.367E-01	8.246E-01	1.515E+01	2.834E-02
30	2.204E-01	4.162E-11	0.000E+00	8.295E+00	0.000E+00	2.302E-01	8.234E-01	1.513E+01	2.718E-02
31	1.764E-01	1.378E-12	0.000E+00	6.631E+00	0.000E+00	2.203E-01	8.221E-01	1.510E+01	2.582E-02
32	1.331E-01	5.425E-14	0.000E+00	5.109E+00	0.000E+00	2.058E-01	8.209E-01	1.508E+01	2.791E-02
33	9.058E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.844E-01	8.197E-01	1.505E+01	3.327E-02
34	4.768E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.497E-01	8.185E-01	1.503E+01	3.764E-02
35	2.956E-01	4.650E+01	4.895E-01	6.268E+01	2.255E+01	9.540E-01	8.903E-01	6.684E+01	3.459E-04
36	3.036E-01	4.705E+01	5.060E-01	6.453E+01	2.337E+01	9.483E-01	8.913E-01	6.687E+01	3.418E-04
37	3.116E-01	4.702E+01	5.058E-01	6.653E+01	2.423E+01	9.491E-01	8.916E-01	6.689E+01	3.274E-04
38	3.179E-01	4.700E+01	5.051E-01	6.811E+01	2.491E+01	9.497E-01	8.917E-01	6.691E+01	6.985E-06
39	3.229E-01	4.697E+01	5.045E-01	3.036E+01	1.115E+01	4.131E-01	8.918E-01	6.692E+01	1.987E-05
40	4.698E-01	1.209E+00	3.535E-02	5.474E+01	1.961E+01	6.553E-01	8.323E-01	6.622E+01	4.517E-04
41	4.144E-01	1.713E-02	1.398E-03	4.629E+01	1.618E+01	6.626E-01	8.290E-01	6.605E+01	0.000E+00
42	3.432E-01	2.870E-04	6.698E-05	3.612E+01	1.232E+01	6.571E-01	8.269E-01	6.587E+01	0.000E+00
43	2.628E-01	6.163E-06	4.206E-06	2.605E+01	8.702E+00	6.378E-01	8.246E-01	6.566E+01	0.000E+00
44	1.769E-01	1.829E-07	3.645E-07	1.701E+01	5.586E+00	5.902E-01	8.221E-01	6.545E+01	0.000E+00
45	8.942E-02	7.685E-09	4.006E-08	9.022E+00	2.928E+00	4.828E-01	8.196E-01	6.523E+01	0.000E+00

TIME = 531.00 MINUTES

AQUEOUS PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	PU (III) (G/L)	REDUCTANT (MOL/L)	NITRATE ION (MOL/L)	DENSITY (G/ML)	MIXER FLOW (L/MIN)	TEMPERATURE (CENTIGRADE)
1	3.000E-02	2.494E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
2	3.000E-02	9.371E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
3	3.000E-02	3.429E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
4	3.000E-02	1.254E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
5	3.000E-02	4.586E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
6	3.001E-02	1.675E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.980E-01	1.000E+02	2.500E+01
7	3.014E-02	5.928E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.981E-01	1.000E+02	2.500E+01
8	3.068E-02	1.299E+00	6.862E-14	0.000E+00	0.000E+00	0.000E+00	9.998E-01	1.000E+02	2.500E+01
9	3.125E-02	7.753E+00	1.289E-12	0.000E+00	0.000E+00	0.000E+00	1.009E+00	1.002E+02	2.500E+01
10	3.154E-02	1.849E+01	9.517E-12	0.000E+00	0.000E+00	0.000E+00	1.023E+00	1.006E+02	2.500E+01
11	3.294E-02	2.934E+01	4.652E-11	0.000E+00	0.000E+00	0.000E+00	1.038E+00	1.009E+02	2.500E+01
12	5.424E-02	3.816E+01	1.857E-10	0.000E+00	0.000E+00	0.000E+00	1.051E+00	1.013E+02	2.500E+01
12	PRODUCT STREAM						\	1.013E+02	
13	3.147E-01	2.904E+01	4.328E-10	5.671E-06	6.934E-02	6.934E-02	1.060E+00	1.413E+01	2.500E+01
14	3.540E-01	3.142E+01	1.812E-06	8.038E-03	6.917E-02	6.921E-02	1.065E+00	1.416E+01	2.500E+01
15	4.146E-01	2.917E+01	2.366E-03	2.560E-01	6.805E-02	6.912E-02	1.064E+00	1.418E+01	2.500E+01
16	4.950E-01	2.554E+01	6.678E-02	1.149E+00	6.421E-02	6.902E-02	1.064E+00	1.420E+01	2.500E+01
17	5.921E-01	2.206E+01	2.718E-01	2.062E+00	6.025E-02	6.888E-02	1.064E+00	1.423E+01	2.500E+01
18	7.081E-01	1.891E+01	4.482E-01	2.570E+00	5.793E-02	6.869E-02	1.065E+00	1.427E+01	2.500E+01
19	8.455E-01	1.590E+01	4.891E-01	2.785E+00	5.680E-02	6.845E-02	1.066E+00	1.432E+01	2.500E+01
20	1.005E+00	1.312E+01	4.396E-01	2.855E+00	5.622E-02	6.816E-02	1.067E+00	1.438E+01	2.500E+01
21	1.185E+00	1.070E+01	3.618E-01	2.867E+00	5.583E-02	6.782E-02	1.070E+00	1.445E+01	2.500E+01
22	1.388E+00	8.681E+00	2.875E-01	2.860E+00	5.546E-02	6.743E-02	1.074E+00	1.453E+01	2.500E+01
23	1.618E+00	7.036E+00	2.260E-01	2.844E+00	5.506E-02	6.696E-02	1.080E+00	1.464E+01	2.500E+01
24	1.642E+00	4.604E-01	4.244E-02	2.848E+00	5.514E-02	6.706E-02	1.071E+00	1.461E+01	2.500E+01
25	1.644E+00	2.777E-02	7.350E-03	2.848E+00	5.515E-02	6.706E-02	1.070E+00	1.461E+01	2.500E+01
26	1.644E+00	1.666E-03	1.266E-03	2.849E+00	5.515E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
27	1.644E+00	9.988E-05	2.178E-04	2.849E+00	5.515E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
28	1.644E+00	5.989E-06	3.747E-05	2.849E+00	5.514E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
29	1.644E+00	3.592E-07	6.424E-06	2.849E+00	5.514E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
30	1.643E+00	2.156E-08	1.080E-06	2.849E+00	5.515E-02	6.707E-02	1.070E+00	1.461E+01	2.500E+01
31	1.638E+00	1.299E-09	1.594E-07	2.850E+00	5.515E-02	6.708E-02	1.070E+00	1.461E+01	2.500E+01
32	1.619E+00	7.951E-11	0.000E+00	2.852E+00	5.519E-02	6.712E-02	1.070E+00	1.460E+01	2.500E+01
33	1.544E+00	5.168E-12	0.000E+00	2.859E+00	5.532E-02	6.728E-02	1.067E+00	1.457E+01	2.500E+01
34	1.254E+00	4.124E-13	0.000E+00	2.886E+00	5.584E-02	6.792E-02	1.057E+00	1.443E+01	2.500E+01
34	PRODUCT STREAM						\	1.443E+01	
35	2.032E+00	8.669E+00	2.537E-01	0.000E+00	0.000E+00	0.000E+00	1.080E+00	1.004E+01	2.500E+01

36	2.114E+00	8.678E+00	2.612E-01	0.000E+00	0.000E+00	0.000E+00	1.083E+00	1.007E+01	2.500E+01
37	2.214E+00	8.184E+00	2.441E-01	0.000E+00	0.000E+00	0.000E+00	1.086E+00	1.010E+01	2.500E+01
38	2.337E+00	7.636E+00	2.240E-01	0.000E+00	0.000E+00	0.000E+00	1.090E+00	1.014E+01	2.500E+01
39	2.480E+00	6.988E+00	2.005E-01	0.000E+00	0.000E+00	1.796E-02	1.098E+00	2.355E+01	2.500E+01
40	2.453E+00	1.030E-01	7.879E-03	0.000E+00	0.000E+00	1.802E-02	1.086E+00	2.347E+01	2.500E+01
41	2.351E+00	1.553E-03	3.207E-04	0.000E+00	0.000E+00	1.808E-02	1.082E+00	2.339E+01	2.500E+01
42	2.182E+00	2.584E-05	1.468E-05	0.000E+00	0.000E+00	1.819E-02	1.076E+00	2.326E+01	2.500E+01
43	1.916E+00	5.152E-07	8.278E-07	0.000E+00	0.000E+00	1.835E-02	1.066E+00	2.306E+01	2.500E+01
44	1.516E+00	1.437E-08	6.699E-08	0.000E+00	0.000E+00	1.859E-02	1.052E+00	2.276E+01	2.500E+01
45	9.611E-01	7.254E-10	9.320E-09	0.000E+00	0.000E+00	1.892E-02	1.033E+00	2.236E+01	2.500E+01

0 ORGANIC PHASE

STAGE NO.	NITRIC ACID (MOL/L)	URANIUM (G/L)	PU (IV) (G/L)	U EXTRACTION FACTO	PU EXTRACT FACTOR	HNO3 EXTRACT FACTOR	DENSITY (G/ML)	FLOW RATE (L/MIN)	INVENTORY CHANGE (%)
1	5.169E-04	8.527E-13	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	0.000E+00
2	5.169E-04	3.203E-11	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	1.063E-06
3	5.169E-04	1.172E-09	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	1.063E-06
4	5.169E-04	4.287E-08	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	7.590E-07
5	5.169E-04	1.568E-06	0.000E+00	2.735E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	1.063E-06
6	5.174E-04	5.734E-05	0.000E+00	2.738E-02	0.000E+00	1.379E-02	8.171E-01	8.001E+01	5.899E-03
7	5.283E-04	2.094E-03	0.000E+00	2.826E-02	0.000E+00	1.402E-02	8.171E-01	8.001E+01	4.329E-03
8	6.906E-04	7.410E-02	1.261E-15	4.563E-02	1.470E-02	1.800E-02	8.172E-01	8.001E+01	3.723E-03
9	1.379E-03	1.623E+00	8.694E-14	1.672E-01	5.386E-02	3.523E-02	8.193E-01	8.005E+01	2.146E-03
10	2.172E-03	9.683E+00	1.607E-12	4.181E-01	1.348E-01	5.497E-02	8.301E-01	8.028E+01	1.410E-03
11	2.641E-03	2.305E+01	1.180E-11	6.280E-01	2.027E-01	6.408E-02	8.482E-01	8.065E+01	8.339E-04
12	4.506E-03	3.654E+01	5.746E-11	7.664E-01	2.477E-01	6.649E-02	8.666E-01	8.103E+01	4.894E-04
13	3.111E-02	4.746E+01	2.299E-10	9.413E+00	2.336E-04	5.696E-01	8.825E-01	8.142E+01	6.762E-04
14	3.408E-02	5.240E+01	9.845E-07	9.605E+00	7.053E-04	5.546E-01	8.894E-01	8.157E+01	7.020E-03
15	4.099E-02	5.281E+01	1.398E-03	1.042E+01	3.114E-02	5.690E-01	8.902E-01	8.160E+01	4.774E-03
16	5.126E-02	5.259E+01	4.497E-02	1.184E+01	2.127E-01	5.954E-01	8.903E-01	8.163E+01	5.353E-03
17	6.422E-02	5.255E+01	2.125E-01	1.368E+01	5.226E-01	6.226E-01	8.909E-01	8.168E+01	7.695E-03
18	8.016E-02	5.253E+01	4.104E-01	1.591E+01	7.789E-01	6.485E-01	8.917E-01	8.174E+01	8.174E-03
19	1.000E-01	5.225E+01	5.330E-01	1.877E+01	9.300E-01	6.757E-01	8.922E-01	8.180E+01	8.351E-03
20	1.241E-01	5.181E+01	5.802E-01	2.248E+01	1.003E+00	7.034E-01	8.924E-01	8.186E+01	6.462E-03
21	1.524E-01	5.133E+01	5.861E-01	2.720E+01	1.029E+00	7.293E-01	8.926E-01	8.194E+01	1.933E-03
22	1.849E-01	5.087E+01	5.769E-01	3.307E+01	1.034E+00	7.518E-01	8.930E-01	8.203E+01	5.431E-03
23	2.218E-01	5.046E+01	5.652E-01	4.025E+01	1.033E+00	7.696E-01	8.936E-01	8.214E+01	4.323E-03
24	3.660E-01	6.752E+00	2.164E-01	1.530E+01	7.814E-02	2.326E-01	8.371E-01	1.525E+01	2.664E-03
25	3.877E-01	4.418E-01	4.065E-02	1.658E+01	1.483E-02	2.458E-01	8.289E-01	1.523E+01	2.332E-03
26	3.893E-01	2.665E-02	7.038E-03	1.667E+01	2.574E-03	2.467E-01	8.283E-01	1.523E+01	4.611E-03
27	3.894E-01	1.598E-03	1.212E-03	1.668E+01	4.433E-04	2.468E-01	8.282E-01	1.523E+01	6.002E-03
28	3.894E-01	9.584E-05	2.084E-04	1.668E+01	7.624E-05	2.468E-01	8.282E-01	1.523E+01	5.851E-03
29	3.893E-01	5.746E-06	3.573E-05	1.667E+01	1.307E-05	2.468E-01	8.282E-01	1.523E+01	2.560E-03
30	3.890E-01	3.446E-07	5.999E-06	1.666E+01	2.194E-06	2.468E-01	8.282E-01	1.523E+01	7.295E-04
31	3.878E-01	2.068E-08	8.815E-07	1.659E+01	3.224E-07	2.468E-01	8.282E-01	1.523E+01	7.782E-04
32	3.831E-01	1.246E-09	0.000E+00	1.634E+01	0.000E+00	2.467E-01	8.281E-01	1.522E+01	2.523E-03
33	3.643E-01	7.590E-11	0.000E+00	1.534E+01	0.000E+00	2.464E-01	8.275E-01	1.521E+01	5.600E-03
34	2.896E-01	4.569E-12	0.000E+00	1.165E+01	0.000E+00	2.427E-01	8.254E-01	1.517E+01	7.471E-03
35	2.408E-01	5.997E+01	6.312E-01	4.617E+01	1.661E+01	7.909E-01	9.076E-01	6.701E+01	2.287E-05
36	2.467E-01	6.122E+01	6.688E-01	4.699E+01	1.706E+01	7.773E-01	9.097E-01	6.706E+01	0.000E+00
37	2.596E-01	6.120E+01	6.697E-01	4.968E+01	1.823E+01	7.789E-01	9.101E-01	6.709E+01	0.000E+00
38	2.756E-01	6.109E+01	6.668E-01	5.297E+01	1.971E+01	7.808E-01	9.104E-01	6.713E+01	0.000E+00
39	2.952E-01	6.097E+01	6.635E-01	2.489E+01	9.440E+00	3.396E-01	9.109E-01	6.718E+01	0.000E+00
40	5.552E-01	2.476E+00	7.103E-02	6.806E+01	2.553E+01	6.410E-01	8.366E-01	6.647E+01	0.000E+00
41	5.437E-01	3.642E-02	2.786E-03	6.654E+01	2.465E+01	6.563E-01	8.328E-01	6.638E+01	0.000E+00
42	5.055E-01	5.482E-04	1.132E-04	6.045E+01	2.196E+01	6.600E-01	8.316E-01	6.628E+01	0.000E+00
43	4.428E-01	9.090E-06	5.162E-06	5.060E+01	1.788E+01	6.628E-01	8.298E-01	6.612E+01	0.000E+00
44	3.444E-01	1.801E-07	2.866E-07	3.628E+01	1.238E+01	6.573E-01	8.269E-01	6.587E+01	0.000E+00
45	1.988E-01	4.744E-09	2.009E-08	1.916E+01	6.317E+00	6.060E-01	8.228E-01	6.550E+01	0.000E+00

Appendix B: Conditional Probability Tables

The conditional probability tables presented in this appendix drive the Bayesian network used to detect diversion. For each of the conditional probability tables, a number of simulations is run and the number of each runs falling in a particular category is tallied. Diversion occurs if 8kg or more of plutonium is removed through either the solvent recycle or the raffinate stream in the time period specified. For example, a run marked as diversion in the 8-hour table would be indicative of at least 8kg of plutonium being removed from the process in 8 hours. Of the runs not marked as diversion, runs are marked as indicative of facility malfunction if either 1) uranium concentration is more than 10% from normal in any of the output streams or 2) 8kg of plutonium going into the uranium product stream over the time period specified. Runs that are marked neither as malfunction nor diversion are deemed to be indicative of normal plant behavior.

In some cases when there is a very low number of counts, subjective assessments were made to ensure that some probability values did not exert an undue influence over the network's behavior.

B.1 8-hour Conditional Probability Tables

U Strip Flowrate				
		High	Normal	Low
State	Normal	4987	4996	2305
	Diversion	0	0	0
	Malfunction	13	4	2695

U Strip Flowrate				
		High	Normal	Low
State	Normal	40.58%	40.66%	18.76%
	Diversion	33.30%	33.30%	33.40%
	Malfunction	0.48%	0.15%	99.37%

Pu Strip Flowrate				
		High	Normal	Low
State	Normal	4961	4996	2103
	Diversion	0	0	0
	Malfunction	39	4	2897

Pu Strip Flowrate				
		High	Normal	Low
State	Normal	41.14%	41.43%	17.44%
	Diversion	33.30%	33.30%	33.40%
	Malfunction	1.33%	0.14%	98.54%

FP Strip Flowrate				
		High	Normal	Low
State	Normal	4958	4996	4639
	Diversion	0	0	0
	Malfunction	42	4	361

FP Strip Flowrate				
		High	Normal	Low
State	Normal	33.98%	34.24%	31.79%
	Diversion	33.30%	33.30%	33.40%
	Malfunction	10.32%	0.98%	88.70%

Fresh Solvent B Flowrate				
		High	Normal	Low
State	Normal	4905	4996	1784
	Diversion	0	0	0
	Malfunction	95	4	3216

Fresh Solvent B Flowrate				
		High	Normal	Low
State	Normal	41.98%	42.76%	15.27%
	Diversion	33.30%	33.30%	33.40%
	Malfunction	2.87%	0.12%	97.01%

Fresh Solvent A Flowrate				
		High	Normal	Low
State	Normal	4983	4996	1871
	Diversion	0	0	2
	Malfunction	17	4	3127

Fresh Solvent A Flowrate				
		High	Normal	Low
State	Normal	42.05%	42.16%	15.79%
	Diversion	33.30%	33.30%	33.40%
	Malfunction	0.54%	0.13%	99.33%

Other Factors					
		Normal	**HNO3+HAN**	**HNO3**	**HAN**
			Unc	ANY	ANY
State	Normal	4996	0	73	20
	Diversion	0	2795	1204	1309
	Malfunction	4	2205	3723	3671

Other Factors					
		All	**HNO3**	**HNO3**	**HAN**
		Unc	Unc	Unc	Unc
State	Normal	98.17%	0.00%	1.43%	0.39%
	Diversion	0.00%	52.66%	22.68%	24.66%
	Malfunction	0.04%	22.96%	38.77%	38.23%

B.2 12-hour Conditional Probability Tables

U Strip Flowrate				
		High	Normal	Low
State	Normal	4907	4973	2304
	Diversion	0	0	0
	Malfunction	93	27	2696

U Strip Flowrate				
		High	Normal	Low
State	Normal	40.27%	40.82%	18.91%
	Diversion	33.30%	33.40%	33.30%
	Malfunction	3.30%	0.96%	95.74%

Pu Strip Flowrate				
		High	Normal	Low
State	Normal	4961	4973	1740
	Diversion	0	0	0
	Malfunction	39	27	3260

Pu Strip Flowrate				
		High	Normal	Low
State	Normal	42.50%	42.60%	14.90%
	Diversion	33.30%	33.40%	33.30%
	Malfunction	1.17%	0.81%	98.02%

FP Strip Flowrate				
		High	Normal	Low
State	Normal	4481	4973	4639
	Diversion	0	0	1
	Malfunction	519	27	360

FP Strip Flowrate				
		High	Normal	Low
State	Normal	31.80%	35.29%	32.92%
	Diversion	33.30%	33.40%	33.30%
	Malfunction	57.28%	2.98%	39.74%

Fresh Solvent B Flowrate				
		High	Normal	Low
State	Normal	4844	4973	1784
	Diversion	0	0	1
	Malfunction	156	27	3215

Fresh Solvent B Flowrate				
		High	Normal	Low
State	Normal	41.76%	42.87%	15.38%
	Diversion	0.33%	0.33%	0.33%
	Malfunction	4.59%	0.79%	94.61%

Fresh Solvent A Flowrate				
		High	Normal	Low
State	Normal	4863	4973	1870
	Diversion	0	0	218
	Malfunction	137	27	2912

Fresh Solvent A Flowrate				
		High	Normal	Low
State	Normal	41.54%	42.48%	15.97%
	Diversion	0.90%	0.90%	98.20%
	Malfunction	4.45%	0.88%	94.67%

Other Factors					
			HNO3+HAN	HNO3	HAN
			Unc	Unc	Unc
State	Normal	4973	0	69	15
	Diversion	0	3626	2463	2056
	Malfunction	27	1374	2468	2929

Other Factors					
		0	HNO3+HAN	HNO3	HAN
		0	Unc	Unc	Unc
State	Normal	98.34%	0.00%	1.36%	0.30%
	Diversion	0.00%	44.52%	30.24%	25.24%
	Malfunction	0.40%	20.21%	36.30%	43.09%

B.3 16-hour Conditional Probability Tables

U Strip Flowrate				
		High	Normal	Low
State	Normal	4408	4777	2299
	Diversion	0	0	0
	Malfunction	592	223	2701

U Strip Flowrate				
		High	Normal	Low
State	Normal	38.38%	41.60%	20.02%
	Diversion	33.3.%	33.40%	33.30%
	Malfunction	16.84%	6.34%	76.82%

Pu Strip Flowrate				
		High	Normal	Low
State	Normal	4956	4777	1139
	Diversion	0	0	0
	Malfunction	44	223	3861

Pu Strip Flowrate				
		High	Normal	Low
State	Normal	45.58%	43.94%	10.48%
	Diversion	33.30%	33.40%	33.30%
	Malfunction	1.07%	5.40%	93.53%

FP Strip Flowrate				
		High	Normal	Low
State	Normal	2953	4777	4579
	Diversion	0	0	102
	Malfunction	2047	223	319

FP Strip Flowrate				
		High	Normal	Low
State	Normal	23.99%	38.81%	37.20%
	Diversion	1.89%	1.89%	23.00%
	Malfunction	79.07%	8.61%	12.32%

Fresh Solvent B Flowrate				
		High	Normal	Low
State	Normal	4426	4777	1769
	Diversion	0	0	210
	Malfunction	574	223	3021

Fresh Solvent B Flowrate				
		High	Normal	Low
State	Normal	40.34%	43.54%	16.12%
	Diversion	0.93%	0.93%	98.13%
	Malfunction	15.03%	5.84%	79.13%

Fresh Solvent A Flowrate				
		High	Normal	Low
State	Normal	4169	4777	1862
	Diversion	0	0	715
	Malfunction	831	223	2423

Fresh Solvent A Flowrate				
		High	Normal	Low
State	Normal	38.57%	44.20%	17.23%
	Diversion	0.28%	0.28%	99.44%
	Malfunction	23.90%	6.41%	69.69%

Other Factors					
			HNO3+HAN	HNO3	HAN
		Normal	Unc	Unc	Unc
State	Normal	4777	0	59	11
	Diversion	0	3953	3217	2457
	Malfunction	223	1047	1724	2532

Other Factors					
		0	HNO3+HAN	HNO3	HAN
		Normal	Unc	Unc	Unc
State	Normal	98.52%	0.04%	1.22%	0.23%
	Diversion	0.02%	41.05%	33.41%	25.52%
	Malfunction	4.04%	18.95%	31.20%	45.82%

B.4 24-hour Conditional Probability Tables

U Strip Flowrate				
		High	Normal	Low
State	Normal	2920	3848	2218
	Diversion	11	0	0
	Malfunction	2069	1152	2782

U Strip Flowrate				
		High	Normal	Low
State	Normal	32.49%	42.82%	24.68%
	Diversion	73.33%	13.33%	13.33%
	Malfunction	34.47%	19.19%	46.34%

Pu Strip Flowrate				
		High	Normal	Low
State	Normal	4836	3848	442
	Diversion	0	0	0
	Malfunction	164	1152	4558

Pu Strip Flowrate				
		High	Normal	Low
State	Normal	52.99%	42.17%	4.84%
	Diversion	33.30%	33.40%	33.30%
	Malfunction	2.79%	19.61%	77.60%

FP Strip Flowrate				
		High	Normal	Low
State	Normal	954	3848	3801
	Diversion	0	0	1062
	Malfunction	4046	1152	137

FP Strip Flowrate				
		High	Normal	Low
State	Normal	11.09%	44.73%	44.18%
	Diversion	0.19%	0.19%	99.62%
	Malfunction	75.84%	21.59%	2.57%

Fresh Solvent B Flowrate				
		High	Normal	Low
State	Normal	3157	3848	1602
	Diversion	0	0	1802
	Malfunction	1843	1152	1596

Fresh Solvent B Flowrate				
		High	Normal	Low
State	Normal	36.68%	44.71%	18.61%
	Diversion	0.11%	0.11%	99.78%
	Malfunction	40.14%	25.09%	34.76%

Fresh Solvent A Flowrate				
		High	Normal	Low
State	Normal	2549	3848	1787
	Diversion	1	0	1473
	Malfunction	2450	1152	1740

Fresh Solvent A Flowrate				
		High	Normal	Low
State	Normal	31.15%	47.02%	21.84%
	Diversion	0.20%	0.14%	99.66%
	Malfunction	45.86%	21.56%	32.57%

Other Factors					
			HNO3+HAN	HNO3	HAN
		Normal	Unc	Unc	Unc
State	Normal	3848	0	43	6
	Diversion	0	757	3938	2837
	Malfunction	1152	4243	1019	2157

Other Factors					
		0	HNO3+HAN	HNO3	HAN
		Normal	Unc	Unc	Unc
State	Normal	98.74%	0.00%	1.10%	0.15%
	Diversion	0.00%	10.05%	52.28%	37.67%
	Malfunction	13.44%	49.50%	11.89%	25.17%

B.5 48-hour Conditional Probability Tables

U Strip Flowrate				
		High	Normal	Low
State	Normal	510	1981	1893
	Diversion	1514	171	1
	Malfunction	2976	2848	3106

U Strip Flowrate				
		High	Normal	Low
State	Normal	11.63%	45.19%	43.18%
	Diversion	89.80%	10.14%	0.06%
	Malfunction	33.33%	31.89%	34.78%

Pu Strip Flowrate				
		High	Normal	Low
State	Normal	3769	1981	80
	Diversion	362	171	15
	Malfunction	869	2848	4905

Pu Strip Flowrate				
		High	Normal	Low
State	Normal	64.65%	33.98%	1.37%
	Diversion	66.06%	31.20%	2.74%
	Malfunction	10.08%	33.03%	56.89%

FP Strip Flowrate				
		High	Normal	Low
State	Normal	117	1981	1721
	Diversion	11	171	3194
	Malfunction	4872	2848	85

FP Strip Flowrate				
		High	Normal	Low
State	Normal	3.06%	51.87%	45.06%
	Diversion	0.33%	5.07%	94.61%
	Malfunction	62.42%	36.49%	1.09%

Fresh Solvent B Flowrate				
		High	Normal	Low
State	Normal	1413	1981	560
	Diversion	0	171	3859
	Malfunction	3587	2848	581

Fresh Solvent B Flowrate				
		High	Normal	Low
State	Normal	35.74%	50.10%	14.16%
	Diversion	0.02%	4.24%	95.73%
	Malfunction	51.13%	40.59%	8.28%

Fresh Solvent A Flowrate				
		High	Normal	Low
State	Normal	730	1981	1273
	Diversion	293	171	2570
	Malfunction	3977	2848	1157

Fresh Solvent A Flowrate				
		High	Normal	Low
State	Normal	18.32%	49.72%	31.95%
	Diversion	9.66%	5.64%	84.71%
	Malfunction	49.82%	35.68%	14.50%

Other Factors					
			HNO3+HAN	HNO3	HAN
		Normal	Unc	Unc	Unc
State	Normal	1981	0	17	3
	Diversion	171	4480	4505	3273
	Malfunction	2848	520	478	1724

Other Factors					
		0	HNO3+HAN	HNO3	HAN
		Normal	Unc	Unc	Unc
State	Normal	99.00%	0.00%	0.85%	0.15%
	Diversion	1.38%	36.04%	36.25%	26.33%
	Malfunction	51.13%	9.34%	8.58%	30.95%

B.6 72-hour Conditional Probability Tables

U Strip Flowrate				
		High	Normal	Low
State	Normal	105	1199	1732
	Diversion	2831	544	2
	Malfunction	2064	3257	3266

U Strip Flowrate				
		High	Normal	Low
State	Normal	3.46%	39.49%	57.05%
	Diversion	83.83%	16.11%	0.06%
	Malfunction	24.04%	37.93%	38.03%

Pu Strip Flowrate				
		High	Normal	Low
State	Normal	2746	1199	35
	Diversion	1040	544	83
	Malfunction	1214	3257	4882

Pu Strip Flowrate				
		High	Normal	Low
State	Normal	68.99%	30.13%	0.88%
	Diversion	62.39%	32.63%	4.98%
	Malfunction	12.98%	34.82%	52.20%

FP Strip Flowrate				
		High	Normal	Low
State	Normal	47	1199	1017
	Diversion	65	544	3866
	Malfunction	4888	3257	117

FP Strip Flowrate				
		High	Normal	Low
State	Normal	2.08%	52.98%	44.94%
	Diversion	1.45%	12.16%	86.39%
	Malfunction	59.16%	39.42%	1.42%

Fresh Solvent B Flowrate				
		High	Normal	Low
State	Normal	933	1199	193
	Diversion	6	544	4371
	Malfunction	4061	3257	436

Fresh Solvent B Flowrate				
		High	Normal	Low
State	Normal	40.13%	51.57%	8.30%
	Diversion	0.122%	11.055%	88.823%
	Malfunction	52.373%	42.004%	5.623%

Fresh Solvent A Flowrate				
		High	Normal	Low
State	Normal	352	1199	885
	Diversion	934	544	3033
	Malfunction	3714	3257	1082

Fresh Solvent A Flowrate				
		High	Normal	Low
State	Normal	14.45%	49.22%	36.33%
	Diversion	20.70%	12.06%	67.24%
	Malfunction	46.12%	40.44%	13.44%

Other Factors					
			HNO3+HAN	HNO3	HAN
		Normal	Unc	Unc	Unc
State	Normal	1199	0	6	2
	Diversion	544	4559	4658	3407
	Malfunction	3257	441	336	1591

Other Factors					
		0	HNO3+HAN	HNO3	HAN
		Normal	Unc	Unc	Unc
State	Normal	99.34%	0.00%	0.50%	0.17%
	Diversion	4.13%	34.62%	35.37%	25.87%
	Malfunction	57.902%	7.840%	5.973%	28.284%